

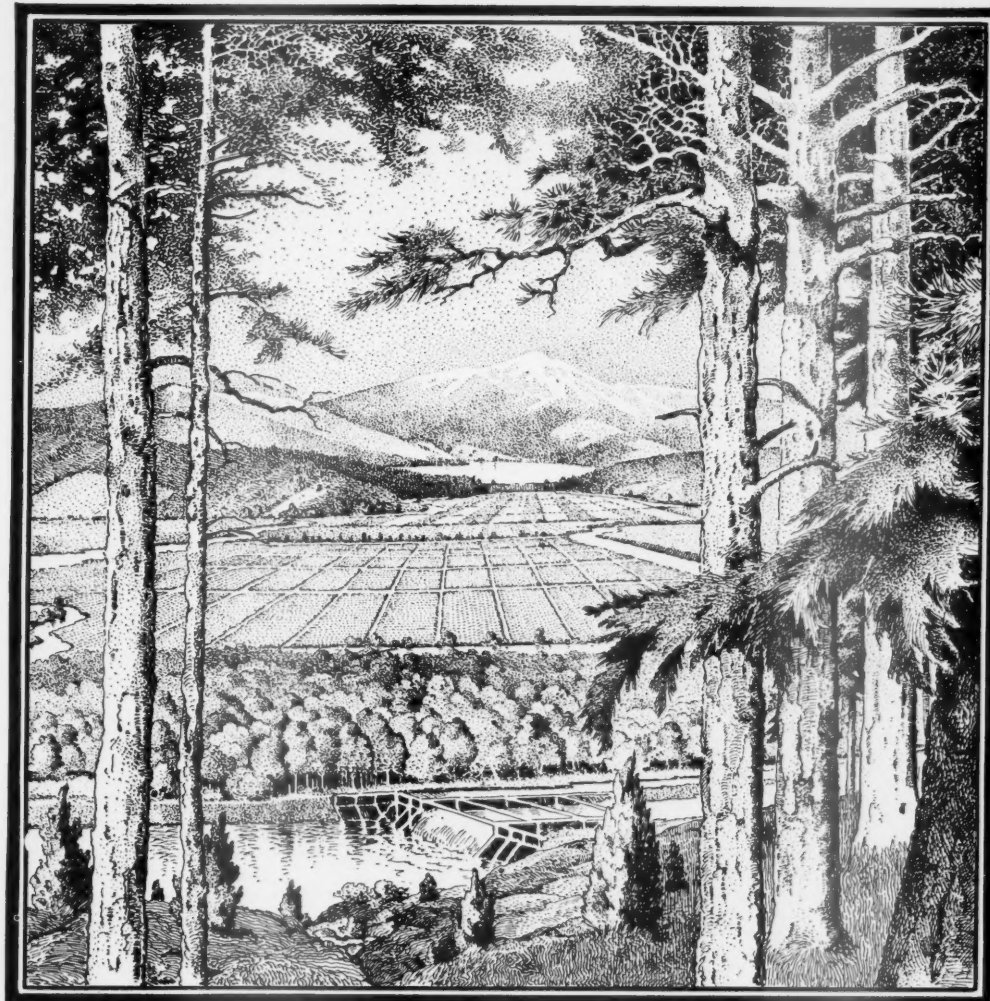
FORESTRY IN CONNECTICUT

Vol. XI—No. 7

JULY, 1905

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# FORESTRY & IRRIGATION



510 Twelfth Street Northwest, Washington, D C

NEWS OF FOREST AND RECLAMATION SERVICES

# CALIFORNIA NUMBER

The August number of FORESTRY AND IRRIGATION will be largely devoted to a discussion of the forest and water problems of California.

It will contain a series of striking and authoritative articles by the experts conducting the Government and State Forest and Irrigation Work.

The aim of FORESTRY AND IRRIGATION in issuing this number is to put before the people of California a resume of what is being done to develop the resources of the State, and to draw them into closer touch with this work.

Following is a partial list of contents:

- THE FOREST SITUATION IN CALIFORNIA. By Gifford Pinchot, Chief of the U. S. Forest Service.
- POLICY OF THE RECLAMATION SERVICE IN CALIFORNIA. By F. H. Newell, Chief Engineer, U. S. Reclamation Service.
- THE FOREST RESERVES OF CALIFORNIA. By A. F. Potter, Grazing Expert, U. S. Forest Service.
- GENERAL OUTLOOK FOR RECLAMATION WORK IN CALIFORNIA. By J. B. Lippincott, Supervising Engineer, U. S. Reclamation Service.
- FOREST FIRES AND THE FOREST IN THE CALIFORNIA SIERRAS. By William F. Hubbard, late of the U. S. Forest Service.
- STUDIES OF CALIFORNIA GROUND WATERS.
- REFORESTING IN CALIFORNIA. By T. P. Lukens, of Pasadena.
- SOME PROBLEMS OF IRRIGATION PRACTICE IN CALIFORNIA. By Elwood Head, Chief Irrigation and Drainage Investigations U. S. Dept. of Agriculture.
- THE FIELD WORK OF THE OFFICE OF EXPERIMENT STATIONS IN CALIFORNIA IN 1905. By Prof. S. Fortier, University of California.
- INFLUENCE OF PRIVATE TIMBERLAND OWNERSHIP ON THE FOREST POLICY OF CALIFORNIA. By E. A. Sterling, Forest Service.
- THE SIERRA CLUB. By Wm. E. Colby, Secretary.

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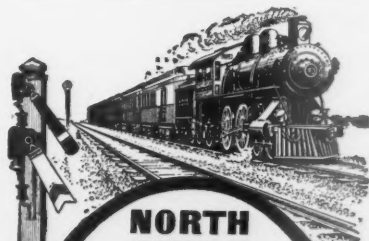
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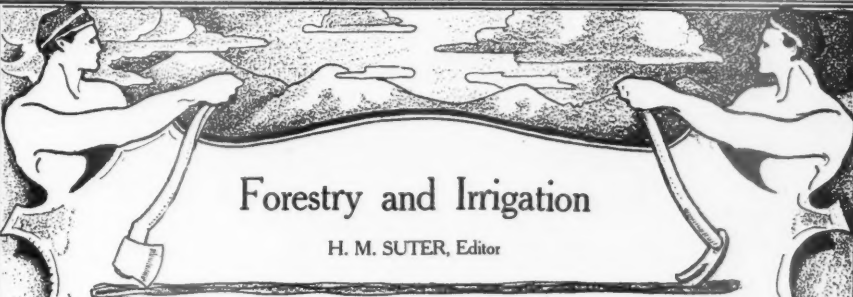
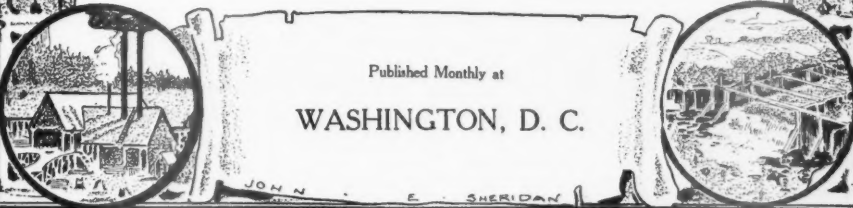
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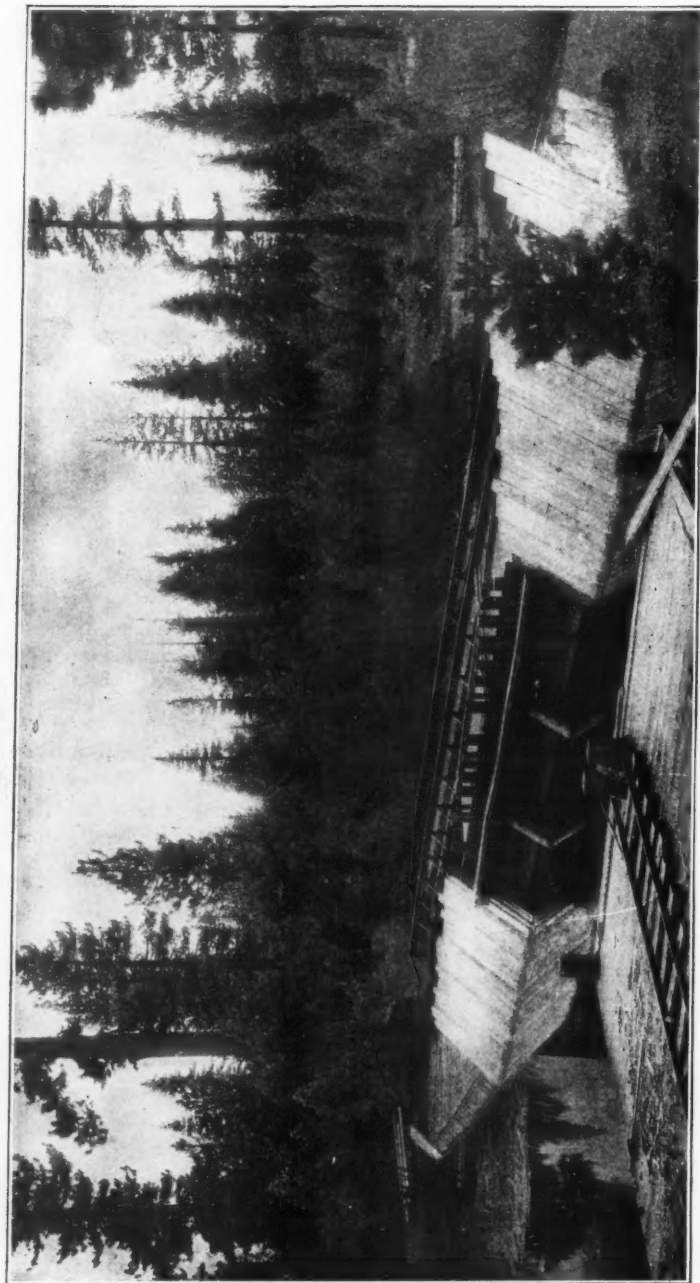
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OUTLET OF LAKE TAHOE, NEVADA

# Forestry and Irrigation.

VOL. XI.

JULY, 1905.

No. 7

## NEWS AND NOTES

### Forestry in Connecticut

This number of FORESTRY AND IRRIGATION devotes considerable space to the forest work now going on in the State of Connecticut. Mr. Austin F. Hawes, State Forester, describes the prevailing forest conditions and suggests methods for their

law passed by the Connecticut legislature on July 5.

From the information given by Mr. Hawes and others it would seem that the forest resources of this state could be greatly increased by judicious management of the present stands, supplemented by planting. Individuals as



MR. AUSTIN F. HAWES

Formerly a member of the Bureau of Forestry; at present he is State Forester of Connecticut in charge of all forest work

improvement. Miss Winslow contributes a short history of the Connecticut Forestry Association, an organization which is almost ten years old, and which is growing in influence. There is also given the full text of the forest

well as the state have alike a good opportunity. It seems that the main thing needed is to spread the knowledge of what to do, and excellent results are likely to follow. For this reason the publisher of FORESTRY AND

IRRIGATION is glad to give space to this project, with a hope of assisting the laudable work undertaken by the Connecticut Forestry Association. The forests of Connecticut can be made a substantial and enduring resource of the state, and it is the duty of its press and the people to back up this idea.

**Reclamation Service Personals** Edward C. Cordell has been appointed bookkeeper in the Reclamation Service and directed to report for duty to L. C. Hill, Roosevelt, Arizona.

Geo. E. H. Goodner has received an appointment as clerk and assigned to duty in the Washington office.

Miss Rosa M. Layton, of Denver, has been appointed stenographer and typewriter and assigned to duty in the Denver office.

Richard G. Manifold, who has been temporarily employed in drafting in the Denver office, has received an appointment under classified service and will continue work under H. A. Storrs, Denver.

F. W. Brose, clerk in Washington office, designated special disbursing agent, and detailed for duty on Hondo project, New Mexico.

Frank C. Dillard has received an appointment as engineering aid and directed to report for duty to J. T. Whistler, Pendleton, Oregon. He is a graduate of the University of Oregon, and has been engaged in Coast and Geodetic surveys in California and Oregon.

Sherman C. Fiske, draftsman in the U. S. Treasury Department, has been transferred to the Reclamation Service and assigned to duty in the Washington office.

Howard S. Reed, of Utah, assistant engineer, has been transferred from Uintah Indian Reservation, Utah, to hydrographic work under L. C. Hill at Phoenix, Arizona. Mr. Reed has had experience in surveying with Moore & Co., on Boston water works, with the Nicaragua and Isthmian Canal Commission, on the Salt River project, Arizona, and assisted in preparing U. S. Geological Survey annual

report. Since June, 1902, he has been engaged as hydrographer and assistant engineer on the Uintah Indian Reservation.

Aldus H. Shellenberger, clerk in office of Secretary of the Interior, has been transferred to the Reclamation Service and assigned to duty in Accounts Division, Washington office. John W. Swift, bookkeeper in Washington office, has been designated special disbursing agent at Billings, Montana.

**Forest Service Personals** E. T. Allen, of the Forest Service, has been appointed by the governor State Forester of California. For the past six years Mr. Allen has been connected with the Bureau of Forestry, although one year of that time was spent as forest reserve inspector for the Land Office. In his new position Mr. Allen will continue as inspector of the forest reserves in California for the Forest Service. He is a thoroughly competent forester, is very familiar with forest conditions in the West, especially in California, and the governor of that state could not have made a better appointment.

G. B. Iull, of the Forest Service, is at Portland, Oregon, acting as the representative of the Service in charge of the government forest exhibit at the Lewis and Clark Centennial Exposition. He will see to it that visitors are furnished all desired information concerning the exhibit and the work the Service is doing, and he will have charge of the courses of popular illustrated lectures on forestry which will be given.

Mr. John H. Hatton has been assigned to duty as Forest Inspector on national forest reserves. His district will include Utah and possibly South Dakota. During July he has been assisting the U. S. Civil Service Commission in the examinations for forest rangers at several places in Colorado.

Mr. Smith Riley has been assigned to duty at Forest Inspector on the national forest reserves. His district will comprise all the forest reserves

in the State of Colorado and the Big Horn and Medicine Bow reserves in Wyoming. He will also assist the U. S. Civil Service Commission in the conduct of examinations for positions of forest ranger at certain places in Colorado.

A. E. Cohoon has been assigned as technical assistant to S. C. Bartrum, Forest Supervisor for the southern division of the Cascade Range Forest Reserve, Oregon.

Ranger Lewis Newcomb, of the San Bernardino Forest Reserve, California, has resigned from the Service.

#### **Suit Against Cornell**

Another chapter in the movement that brought about the establishment and later the discontinuance of the New York State College of Forestry has been opened.

Attorney General Mayer, of New York, has decided to bring an action to deprive Cornell University of 30,000 acres of timber land between Tupper and Upper Saranac Lakes, in the Adirondacks. Mr. Mayer will endeavor also to break a contract whereby Cornell has permitted the Brooklyn Cooperage Company to cut timber on the tract.

This tract was purchased by Cornell with \$165,000 out of an appropriation of \$500,000 made by the legislature of 1898 for a forestry experiment, to last thirty years. The Brooklyn company began cutting timber on the tract in 1900, and as a result people who lived in the vicinity protested vigorously. Inquiries were made into the forestry experiment, which was being carried on under the direction of Dr. B. E. Fernow, head of the New York State College of Forestry.

Governor Odell in 1903 declined to permit any more money to go out for the experiment, and that came to an end. The Brooklyn company, however, still continued to cut timber, and the Association of Residents of Upper Saranac Lake, who had fought the Cornell idea from the first, asked Mr. Mayer to bring an action that would terminate the contract. They

declared that the purpose of the statute was being defeated, as the enterprise was not a forestry experiment.

In his opinion handed down to-day Mr. Mayer says:

"There is no suggestion that the authorities of Cornell University entered into this contract through other than good motives. It seems that they had been advised by the forestry expert in their employ that the best method of experiment was to denude the tract, in order that the result of reforestation could be ascertained within the life of men then living.

"So far as the testimony and arguments before me disclosed, no official of the State of New York was consulted, directly or indirectly, in regard to the agreement above referred to. It cannot be said, therefore, that the state was in any way responsible for this contract, or that it acquiesced in the terms thereof.

"In my opinion, it was never contemplated that under any circumstances Cornell was to be permitted to make a contract for the stripping of the forest within a possible fifteen years on a tract of land which was dedicated to an educational experiment of thirty years."

#### **Bridge Contract**

The Secretary of the Interior has awarded the contract for the construction of a pile bridge across North Platte River, about 25 miles southwest of Casper, Wyoming, to James F. Stanley, of Casper.

This bridge is to be used in connection with the North Platte project. Three bids were received, of which Mr. Stanley's—\$3,384.70—was the lowest.

#### **Bids for Tunnel**

The Secretary of the Interior is advertising for bids for the construction of the Corbett diversion tunnel, Shoshone project, Wyoming. This tunnel is to be approximately 17,000 feet long. The auxiliary works will include the excavation of about 28,000 cubic yards of material in open cut. These works are located about 10 miles east of

Cody. The proposals will be received at Billings, Montana, and will be opened on September 6, 1905. Particulars may be obtained by addressing the Chief Engineer, Washington, D. C., or the engineer in charge, Mr. J. Ahern, Cody, Wyoming.

**More About  
Silviculture**

The following letter, commenting on the suggestions contained in Mr. Schwarz's letter to the editor and published in the June number of *FOR-*

*EDITOR FORESTRY AND IRRIGATION:*

Dear Sir:—The proposal by Mr. Frederick Schwartz, in *FORESTRY AND IRRIGATION* for June, that portions of the forest reserves be utilized as silvicultural sample plots on a large scale, deserves thorough consideration. Probably every forester will admit that our knowledge of silviculture at the present time is almost purely empirical. The notes found in the books regarding the "silvicultural charac-



**MR. WALTER MULFORD**

First State Forester of Connecticut who did much to interest the people of that state in forestry. He is now with the U. S. Forest Service, but later will become a member of the Faculty of the Forest Department at the University of Michigan.

*ESTRY AND IRRIGATION*, from Mr. Ernest Bruncken, author of "American Forests and Forestry," is given in full, as an indication that the study of silviculture in America is a subject of deep interest to our foresters:

ters" of forest species are hardly more valuable than the directions printed on the five-cent packages of garden seeds one buys at the corner groceries. The time for a scientific silviculture, however, has hardly yet arrived. It pre-



supposes a far more thorough knowledge of ecology than has been attained so far. For investigations of this kind the reserve sample plots suggested by Mr. Schwartz would serve excellently. The field study of ecology is at the present time handicapped by the fact that there are no accurate records of observations regarding changes in the flora of definite areas, extended over considerable periods of time. Such records cannot be obtained under ordinary conditions, because the factor of human interference cannot be sufficiently eliminated. If every forest reserve had one or more districts of reasonable size set apart and protected against all human disturbance, these would go far in helping to discover the laws by which natural conditions affect tree growth.

Perhaps it would be feasible for the Forest Service to enlist the coöperation of the botanical departments of the various universities in this work. A great deal of geological field work is now being done by botanists. There is reason to believe that they would welcome such a policy, especially if in the neighborhood of each protected tract a simple laboratory containing facilities for the most indispensable physiological and morphological work could be erected.

ERNEST BRUNCKEN.

Sacramento, Cal.

#### Forests and Water

An apt illustration of the relation between forests and the conservation of water is shown in a recent letter by Clinton Harris, of Nashville, Tenn., printed in *Recreation*. The letter is as follows:

"To illustrate the relationship between forests and water, make a couple of troughs, line one with clay to represent the country denuded of trees, the opposite trough line with sods of grass or moss to represent the forest-clad mountain side, set them on an incline and connect their upper ends with a rough reservoir. Pour a pail of water into this reservoir and there will be a wild rush of water down the

clay-lined trough, while the moss and grass-lined one will drip for hours.

"It only needs a little imagination to convert this machine into a forest-clad mountain and one denuded of timber.

"The cloudburst represented by the contents of the bucket of water suddenly poured into the top reservoir is only a dangerous cloudburst on the barren slope. By the use of this simple device you can explain to a child the absolute necessity of preserving the forests upon the watersheds, if we would have continuous running water and not the certainty of flood and drought which are caused by the watersheds being recklessly denuded of timber."

#### Work of Forest Service

The Forest Service during the summer field season issues monthly a schedule of field work and assignments. The programme for July indicates work in 21 states and territories and in Hawaii. It includes the making of working plans and planting plans, fire protection studies, the care of forest nurseries, inspection of forest reserves, special studies of trees and their products, timber seasoning and testing, and many other practical lines of work in which the Forest Service is engaged. The names, addresses, and character of study of all Forest Service officials engaged in this work and also of those having direct charge of the different forest reserves will be published monthly in the field programme. In another part of this number of *FORESTRY AND IRRIGATION* the work of the Forest Service is treated somewhat in detail.

#### Studying Lumber Trade

A new section called "lumber trade" was created by the Forest Service July 1, in the office of Forest Products. Its purpose is to study the supply, transportation, markets, and use of lumber and other forest products. The various grading specifications will be brought together for comparison by both buyers and sellers of lumber, as has been done in the case of log rules. Hitherto there has

been a decennial census of the lumber industry, but the intention now is to publish, in coöperation with the National Lumber Manufacturers' Association, an annual statement of the amount of lumber cut and marketed. The movement of lumber will be followed from the forests through the great commercial centers until it reaches the consumers.

Special uses of wood as for cooperage and boxes, vehicles and implements, and for paving blocks will be carefully considered. The study will include an investigation of the qualities of the woods at present used; an estimate of the supply of timber of these kinds available; an investigation of the properties of other and more abundant woods which may be substituted for the species now employed; and a study of methods of manufacture with a view to recommending improvements which will increase the output and lessen the waste from the raw material.

**Vermont Forest Experiment** The Reading Pond Trout Club, which was organized in March, will do business on a large scale. The capital stock of the corporation, originally \$3,000, has been increased to \$50,000, which is held by men deeply interested in the development of Vermont. The club has acquired 5,500 acres of woodland, meadow, pasture, and tillage land in the vicinity of Reading Pond, near Woodstock. In pursuit of the propagation of game fish, 30,000 brook trout have already been deposited in the brooks and pond; but the larger plans of the club, and those in which the public is directly interested are, however, along the lines of scientific forestry and farming.

It is not designed that these lands, which include some of the best and some of the worst in Vermont, shall lie idle. On the contrary, the forests, in the first place, are to be managed on the most economic principles. Instead of stripping the woodlands and reducing them to a nominal value in

a season or two, it is expected that they will be lumbered so that they will increase in value from year to year. Only such timber will be cut as is mature, and there will be planting to replace those trees that are felled. Wastes, slopes, elevations, and localities will be carefully studied; large areas will be planted with German and Colorado spruce, white and black ash, cherry and various other hard and soft woods, and results watched with a view to determining what timber trees are most profitable in the different locations.

Competent men will be in charge of the lands and the working out of the forest problem will be watched with considerable interest.

**Timber Statistics** Steps have just been taken to determine the total annual cut and consumption of lumber in the United States. The National Lumber Manufacturers' Association, at its last meeting in Chicago, favored the getting of such statistics, and the Bureau of Forestry for some time has been considering similar work; the two have now combined forces to this end. Mr. George K. Smith, the secretary of the association, recently visited Washington to confer with the Bureau, and a definite plan has been decided upon. Near the close of each calendar year blanks will be sent the secretaries of all lumber associations, who will forward them to all saw-mills in their jurisdiction. When filled in these cards will show the total cut of each mill, the total shipments, and the stock left on hand; they will then be mailed direct to Washington. The Department of Commerce and Labor will assist in the work in the way of furnishing names of lumbermen, and in computing the results. The plan will be put into effect at the close of this year, and as early as possible after January 1 a statement of results will be published. The proposed work will be of great practical value in determining the rate at which the forest resources of the country are actually being used up.

# WILLIAM FAIRCHILD HUBBARD

BY

GEORGE B. SUDWORTH

THE premature death of William Fairchild Hubbard deprives the forest profession of one of its brightest members. He lost his life on July 17, 1905, while canoeing near the

panion was carried swiftly downstream, barely escaping death.

Mr. Hubbard was a professional forester by training, and at the time of his death held the position of For-



WILLIAM FAIRCHILD HUBBARD

Great Falls of the Potomac River, in company with Mr. Robert W. Ayres. The canoe was capsized in a powerful back-current, throwing both men into the water. Although an exceptionally strong swimmer, Mr. Hubbard was unable to save himself, while his com-

est Assistant in the Forest Service of the United States Department of Agriculture, having entered the department in February, 1901. He was born in North Carolina in 1876. His early education was received in the public schools of Washington, D. C., and in

Trinity University, Toronto, Ontario. Subsequently he studied forestry at the universities of Munich and Tübingen, receiving from the latter institution the degree of Doctor of Political Sciences. During his course of forest study he served as voluntary assistant in one of the government forests of Thuringia. He qualified for the United States Forest Service by passing the Civil Service examination for trained foresters, and similarly also for the Philippine forest service, which at one time he anticipated entering.

Through his special academic training in political sciences, Mr. Hubbard brought to his professional work in forestry a rare but most valuable attainment—a knowledge of the important part which forests and their proper use play in the economic life of the nation.

For one so young, Mr. Hubbard had achieved much in practical forest work that does lasting honor to his name. Among his important contributions published and being published by the Forest Service, is a bulletin on the basket willow, a study which makes available new facts of great value to an important American industry. He has also prepared in collaboration with Colonel William F. Fox a bulletin on the maple sugar industry. Mr. Hubbard's contribution to this publication—just now going through press—is a discussion of the silvical requirements of sugar maples in their relation to sugar production, as well as a large part of the discussion relative to the commercial status of maple sugar.

But a few days before his death Mr. Hubbard practically finished a most valuable paper for publication, entitled "Forests and Forestry in the United States." In this he has traced the bearing which our wealth of tim-

ber has had upon the development of the country, and the relationship which the forested regions bore to the commercial and economic standing of various communities. Fortunately, on account of its great value, he had also outlined and practically completed a plan for the protection from fire of a large timber tract in northern California. This plan was based upon field studies conducted last summer, and had already been accepted and put into effect.

Besides these larger accomplishments, Mr. Hubbard has conducted a number of minor but important forest studies. To all was given the stamp of his peculiarly original thought. In no manner did he display the perhaps too common school-bred narrowness of university men. His mind was quick to grasp the practical bearings of a problem and to solve it in the most direct way. The government forest work to which he was assigned interested him deeply beyond the matter of official duty. He often found time to contribute valuable discussions in connection with them for publication in the forest journals of the country.

His devotion to forestry and his achievement in that field led to his election, in 1902, as an active member of the Society of American Foresters, in the proceedings of which he took the greatest interest.

Mr. Hubbard possessed a most attractive personality, and was very highly esteemed by all who knew him well for the gentleness of his nature and for his manly character. He was recognized at once as a leading spirit among his friends and in almost every movement with which he was connected. His untimely death is to be regretted the more, since he gave promise of more than ordinary achievement in his profession.



# FORESTS AND FORESTRY IN CONNECTICUT

BY

AUSTIN F. HAWES

State Forester of Connecticut

LIKE the rest of southern New England, the forest area of Connecticut is steadily increasing, and this misleads many to think that the forest question will care for itself. The great trouble is, of course, in the poor character of much of this woody growth, and the scant chance which it has in the natural course of events to become of any value for at least a generation. On the other hand there is a great deal of valuable woodland in all parts of the state which serves as a good example of what is possible.

Chestnut is the most important tree of the state and in many forests forms the largest portion of the mixture. Next in importance is the white pine which forms pure stands in the northeast part of the state and is mixed with chestnut and oaks and other hardwoods throughout the northern section. There is probably no virgin timber in the state, the white pine stands being largely the growth which has encroached on abandoned fields and the sprout woods bear evidence of two or often three generations.

Probably nearly one quarter of the total area of the state is nearly worthless land, which is gradually coming up to gray birch, pitch pine, and juniper. This land has an average value of perhaps \$3 an acre, the price varying with the locality. Some of the most barren wastes which lie near railroads are held as possible factory sites at \$5 to \$10 an acre. While some of this land is now yielding a scanty supply of cord wood, the prices from such material, except near the cities, are so low that the owners place practically no value upon their land and allow it to remain totally neglected and to be

frequently burned over. One of the first things for forestry to demonstrate is that it is entirely feasible in most cases to plant up such land as this.

The thrifty growing young forests offer every inducement for thinning, especially is this the case in the sprout growth of chestnut and oaks. The highest values from such forests are derived where there is a good crop of poles and railroad ties. Poles delivered bring as high as \$13 apiece, the average thirty foot pole selling from \$2.50 to \$3. The first grade of railroad ties are now sold for 42 cents, and the seconds for 30 cents. There is always a large proportion of inferior trees in these natural stands which not only will never give these valuable products, but also interfere with the best development of the good trees. In remote situations where the cost of removal might eat up the small profit in cordwood thinnings can often be made remunerative by converting the wood into charcoal. The customary reckoning is that 30 cords of wood will produce 1,000 bushels of coal. The value of the "coal" is seven to eight cents a bushel. The cost of burning sixty cords amounts to about \$45, leaving \$1.58 as the average return for stumpage, cost of cutting the wood and hauling the charcoal. As the cost of cutting amounts to 90 cents to \$1, the result gives a low stumpage value. In fact in some localities where the coal burners buy stumpage they pay 33 cents a cord. These figures show, however, that in most remote sections such thinnings can pay for themselves. One of the advantages in burning into coal results from the fact that round wood can be used, while there is



Part of Connecticut State Forest after thinning. The cost of this land to the State was two dollars an acre.



scarcely any market for this young material as wood. In good sprout stands, 30 years old, eight or ten cords of this inferior material can usually be removed from an acre, thus giving the remaining trees plenty of room for development. The high values which have resulted from untreated sprout stands encourages one to expect even greater returns from systematic treatment of this sort. I have a record of a lot of about three acres from which were cut 65,000 feet B. M. of chestnut

ferent. The lack of knowledge on the part of the farmer as to the value of his pine timber results in lumbermen being able to buy it for very low figures. This is not so much the case now as it was a few years ago, for with the growing scarcity of stumpage there is naturally some appreciation in prices. There are no large lumbermen in the state, but there are in every locality men controlling portable saw mills who cut from one-half million to four or five million feet a year, including



Planting forest trees on sand plain in Connecticut. This land is assessed at six dollars an acre though worthless for agriculture.

and oak lumber and poles enough for 10,000 feet more, besides 118 cords of wood. Another ten acre lot of sprouts about forty years old sold recently for \$1,000, though the land itself was probably not valued at over \$5 an acre.

Many of the owners of such hardwood land appreciate the value of thinnings since they are holding their lands for a definite purpose, that of producing poles and ties which require a growth of about 40 years.

The white pine problem is quite dif-

ties and poles. While the competition among these men is now so keen that they are obliged to bid up to prices somewhat approaching the actual value of the woodlots, they sometimes overcome this difficulty by agreeing among themselves on a satisfactory distribution of the lots for sale. These lumbermen are usually men who started in with very little capital, but have gradually increased their business. They aim to turn over their money as soon as possible, and for this reason

these pine stands are cut off when they are far from mature. On white pine between thirty and forty years old lumbermen frequently make over 30 per cent. on the money invested within a year or so after purchase. While this young pine may be growing at a most excellent rate, possibly as high as 8 per cent., there is little inducement for holding if these much higher immediate returns can be realized and the operation repeated indefinitely.

A few figures illustrating the character of these forests may be of interest. One lot of four and one-half acres gave a yield of nearly 100,000 feet B. M.. Boxboards are now worth about \$12 a thousand delivered at the railroad, while some of the square edge pine runs as high as \$16. From 25 to 50 per cent. of the cut is usually of the latter character. In Union, the principal pine town of the state, an 80 acre lot sold this winter at \$100 an acre. The general character of the pine stand in this region is illustrated by a lot of fifteen and one-half acres which produced 459,000 feet B. M., or an average of nearly 30,000 feet. The net profit on this lot to the lumberman amounted to \$2,000. Some of the original virgin pine timber, the last of which was cut about fifteen years ago, is reported to have run 100,000 feet to the acre.

If this state of things could last indefinitely there could be no particular objection to the present methods, but since the supply of pine is rapidly approaching exhaustion the cutting of this immature, rapid growing pine is naturally a source of regret. The only remedy seems to be the education of the land owners to an appreciation of the real value of their timber and the rate of interest at which it is growing. If they understood that their timber is growing at a rapid rate of interest and that prices are also increasing they would hold this timber and could be induced to practice forestry. The lumbermen would also benefit in the end for the stability of their business would be maintained.

If these forests were kept to an age of sixty to seventy-five years instead of being cut at about forty there would be opportunity for good forestry work. There is little doubt that careful thinning would result in very much better lumber and greater yields. Thinnings are in most cases perfectly feasible. I have the opinion of a lumberman for authority that when lumbering is going on in a region neighboring stands could be thinned out without financial loss. Where the trees to be removed are six inches in diameter or over they can be sawed into boxboards, and in some sections there is a market for pine fuel.

The question of production is, perhaps, the most important. White pine is naturally such a fine reproducer that it seems there should be no difficulty in securing a new stand. Methods of lumbering in common use remove everything on the land so that not only no seed trees are left, but patches of reproduction which are often very thick and sometimes ten feet high are totally destroyed. Where lumbermen have purchased the land as well as the timber they should be far-sighted enough to leave seed trees, and there are always plenty of worthless trees on a lot which could serve for such purposes. Strange to say there seems to be more interest among lumbermen in planting this land after lumbering than in making any attempt at natural reproduction. Owners who sell to lumbermen simply the timber, retaining the land, could easily make some contract whereby seed trees would be left.

Undoubtedly the clear cutting method yields the highest present financial results, but these forests are admirably suited to either the strip or group system of regeneration and one of these would probably prove most remunerative in the long run.

One of the chief objections to holding pine until maturity is, of course, the danger from fire. This, as everywhere, is the chief impediment to for-

estry. There are at present\* no adequate laws against fire, but there is now a bill before the General Assembly for the purpose of creating a fire service similar to that of New York, but combining some of the good points of other state laws and a few original measures.

The forestry movement in the state was inaugurated some three years ago under the direction of the Agricultural Experiment Station. The station appointed a forester with the hope of interesting the land owners of the state in forestry work. As one of the first steps toward this an experimental plantation was started a few miles north of Hartford on a sand plain. About sixty acres of land valued at \$6 an acre have been planted to different species, as shown by the accompanying diagram. These plantations have been as experiments in methods of planting, distance of spacing, and value of different mixtures. A new series of experiments is now being undertaken on adjoining land of similar character to ascertain how cheaply planting can be done.

The station has recently published a circular advertising its scheme of cooperation with private owners which is similar to that of the national Forest Service, and of the State Forester of Massachusetts.

By act of legislature the Station Forester was made State Forester; the principal duties connected with this office being the creation and care of a state forest. This law, which has thus far carried an annual appropriation of \$1,000, provides that the forester may buy land at a price not exceeding \$4 an acre. He may plant this land, or make thinnings or take such other measures as he may deem necessary to bring about a profitable growth of the timber thereon. Up to the present time about one thousand acres of sprout land have been purchased in the towns of Portland and Chatham at an average cost of \$1.63 an acre. As an appreciation of forestry gradually grows in the state it is hoped that a more generous appropriation may be devoted to the work and greater progress made.

\* NOTE.—Since foregoing article was written a fire law has been passed and text given in this number.

## THE CONNECTICUT FORESTRY ASSOCIATION

Short History of the Organization that is Promoting the Cause of Forestry in Connecticut

BY

MARY WINSLOW

THE Connecticut Forestry Association was founded in December, 1895, by the late Rev. Horace Winslow, and a few others, at the house of the former in Weatogue, in the old town of Simsbury. Mr. Winslow was the first president and continued in office until May, 1898, when on account of failing health, he declined a re-election.

Mr. Winslow was succeeded by Major Edward V. Preston, of Hartford. When Major Preston was compelled by the pressure of important business to lay aside the office, he was followed by Mr. Walter Mulford, then State Forester for Connecticut, but now of the Forest Service of the U. S. Department of Agriculture, who was in turn succeeded by Dr. E. H. Jenkins

director of the Connecticut Agricultural Experiment Station at New Haven.

The chief objects of the Association are: To develop public appreciation of the value of forests and woodlands and of the need for preserving and using them rationally; to forward the establishment of forests, parks, and reservations; to disseminate information regarding forestry and kindred topics.

In the State of Connecticut, land from which the timber has been removed is so naturally and quickly recovered with tree growth that at one time it was a difficult matter to convince some persons that an organization of this character was needed at all. Other people thought we had trees enough. Still others seemed to care little whether or not any trees were left on the highways for shade or ornament. So the Association has had some discouragements to meet and indifference to overcome, but in spite of all, now is apparently on a firm basis, and likely to live, prosper, and to accomplish much for the cause of forestry.

As the subject is brought more and more before the minds of the people, they are beginning to realize that all of forestry is not expressed by the act if *planting trees*, nor by that of *cutting them down*. But they do see that to manage a farm, or even a woodlot, in a practical manner requires the exer-

cise of as much thought and common sense as to raise an agricultural crop.

The Connecticut Forestry Association has held some public meetings, with speakers of eminent rank, and it is planned to have more such meetings in different cities of the state, at frequent intervals. It has also printed and distributed widely through the state, a number of leaflets, and these are only the beginnings of a series of such.

The publication committee is to commence very soon, a sort of propaganda by means of the press of Connecticut, and excellent results are anticipated from this work.

The officers of the Association, elected in May, 1905, are as follows: President, Dr. E. H. Jenkins, New Haven, Conn.; vice-presidents, Prof. Henry Ferguson, Hartford; Hon. T. S. Gold, West Cornwall, and Mr. Willis I. Twitchell, Hartford; recording secretary, Mr. Everett S. Geer, Hartford; corresponding secretary, Miss Mary Winslow, Westogue; treasurer, Mr. Alfred Spencer, Jr., Hartford; auditor, Mr. Appleton R. Hillyer, Hartford; advisory board, the above-named and Major Edward V. Preston, Hartford; Mr. Edward A. Bowers, New Haven, and Mrs. Bessie G. Gerard, South Norwalk.

Publication Committee—Dr. E. H. Jenkins, New Haven; Mr. Austin F. Hawes, State Forester, and Miss Mary Winslow.

## CONNECTICUT'S NEW FOREST LAW

Passed by Legislature on July 5th, and deals with Forest  
Fire Wardens and the Protection of Forests from Fire

Section 1. The state forester shall be, *ex officio*, state forest fire warden, and shall receive no additional compensation therefor, but shall receive his necessary traveling and other expenses, to be paid in the manner pro-

vided for in section 4450 of the general statutes.

Sec. 2. Said forest fire warden shall have supervision of town fire wardens, shall instruct them in their duties, enforce the law as to fire districts in

towns, issue such regulations and instructions to the town and district fire wardens as he may deem necessary for the purposes of this act, and cause violations of the laws regarding forest fires to be prosecuted.

Sec. 3. The selectment of any town shall, upon the request of the state forest fire warden and with his concurrence, appoint a town fire warden who shall act for the term of one year under the instructions of said state warden. When required by the state warden, such town fire warden shall, and any such town fire warden may establish two or more fire districts in the town for which he is appointed, and appoint a resident of such district as district fire warden; in the absence of town and district fire wardens, the first selectman may act as fire warden.

Sec. 4. Town and district fire wardens shall prevent and extinguish forest fires in their respective towns, and enforce all statutes of this state now in force or that may hereafter be enacted for the protection of forest and timber land from fire, and they shall have control and direction of all persons and apparatus while engaged in extinguishing forest fires, outside the limits of cities or boroughs. Any fire warden may arrest, without a warrant, any person or persons taken by him in the act of violating any of the said laws for the protection of forest and timber lands, and bring such person or persons forthwith before a justice of the peace or other magistrate having jurisdiction, who shall proceed without delay to hear, try, and determine the matter. During a season of drouth the town fire warden may establish a fire patrol in the town, and in case of fire in or threatening any forest or woodland the town and district fire wardens shall attend forthwith, and use all necessary means to confine and extinguish such fire. The said fire wardens may destroy fences, plow land, or, in an emergency, set back-fires to check any fire. They may summon any male resident of the town

between the ages of eighteen and fifty years to assist in extinguishing fires, and may also require the use of horses and other property needed for such purpose; any person so summoned and who is physically able who refuses or neglects to assist or to allow the use of horses, wagons, or other material required, shall be liable to a penalty of not less than five dollars nor more than one hundred dollars. No action for trespass shall lie against any person crossing or working upon lands of another to extinguish fire.

Sec. 5. The town and district fire wardens shall receive two dollars and fifty cents per day for time actually employed at forest fires or in the prevention thereof. The selectmen shall fix the price per hour to be paid to laborers at forest fires, employed by the fire wardens or their deputies, not exceeding twenty cents per hour, and shall give notice thereof to the town fire warden and the state forest fire warden; but if the selectmen neglect to fix said price the town fire warden may pay at the rate of twenty cents per hour for such services. The said wardens shall render to the selectmen a statement of the services rendered by them and by the men, teams, and the other apparatus employed by them as provided by this act, within one month of the date of such services, which said bill shall show on detail the amount and character of the services performed, the exact duration thereof, and all disbursements made by said wardens; said bill shall be audited, and if approved by the selectmen of the town wherein such services were rendered and expenses incurred, shall be paid on the order of said selectmen by the town treasurer. A duplicate bill, showing that the same has been audited and paid by the town, shall be filed by the town treasurer with the state forest fire warden; a copy thereof shall also be sent by said treasurer to the county commissioners of the county in which said town is situated, and the commissioners shall thereupon draw their order on the



county treasurer in favor of said town for one-fourth of the amount of said bill, and another copy shall be sent to the state comptroller, who shall draw his order on the state treasurer in favor of said town for one-fourth of the amount of said bill.

Sec. 6. All moneys received from fines imposed under and by virtue of the provisions of sections 1218, 1222, and 1237 of the general statutes shall be paid to the state treasurer and kept by him as a separate fund, to be paid out by him upon the requisition of the state forest fire warden, for use in connection with the prevention and suppression of forest fires, and such disbursements shall be audited by the state board of control as provided in section 4450; *provided*, that the state forest fire warden shall pay one-half of the amount collected as a fine to the fire warden or other person upon whose information the proceedings in which such fine was imposed were instituted, but not exceeding fifty dollars in any one case.

Sec. 7. Section 1218 of the general statutes is hereby amended to read as follows: Every person who shall set on fire any woods, or stack of hay or grain, so as thereby to occasion injury to another; or shall injure or destroy any public bridge, or any fire engine or hose, or any mill-dam, or hydraulic works, or any machinery attached to any mill, manufactory, or steamboat; or shall kill, wound, or disfigure, or administer any poison or noxious substance to any horse, ass,

mule, or neat cattle, with intent to kill, or injure the same, or shall injure any cloths in process of manufacture, shall, if such act is done wilfully, be fined not more than one thousand dollars, or imprisoned not more than six months, or both.

Sec. 8. Section 1222 of the general statutes is hereby amended to read as follows: Fires kindled by throwing down a lighted match, cigar, or other burning substance, shall be deemed within the provisions of sections 1220 and 1221, and every person violating any provision of said sections shall be fined not more than five hundred dollars, or imprisoned not more than six months, or both.

Sec. 9. Section 1237 of the general statutes is hereby amended to read as follows: Every person who shall, wilfully, and without color of right, cut, destroy, or carry away, any trees or timber of the dimensions of four inches diameter, or more, or any hoop-poles standing on the land of another, shall be fined not more than two hundred dollars, or imprisoned not more than ninety days, or both.

Sec. 10. The town and district fire wardens shall post such notices, containing the state laws concerning fires, as the state fire warden may prepare, and any person who wilfully or maliciously tears down or destroys any such notice shall be fined ten dollars.

Sec. 11. All acts or parts of acts inconsistent with the provisions of this act are hereby repealed.





# THE EFFECT OF FOREST COVER UPON STREAM FLOW

## PART II.

### A STUDY OF DRAINAGE CONDITIONS IN THE CATSKILL MOUNTAINS

BY

W. B. GREELEY

Forest Assistant, U. S. Forest Service

IN the preceeding paper upon this general subject<sup>1</sup> it was strongly emphasized that forest cover must not be considered as an independent or isolated factor in its bearing upon stream flow; that it is rather but one of a number of far reaching, inter-related factors whose combined influence makes a stream's discharge regular or irregular; and that before any influence can justly be attributed to the forested or denuded character of a drainage basin the bearing of all of these other factors, precipitation, topography, geological conditions, must be carefully weighed. An attempt to approach the question in this manner was made by the writer in a study of two small tributaries of the Hudson, Esopus Creek and Wallkill River, under the direction of Mr. Newell, of the Reclamation Service. With the object of getting at the influence of all the factors which affect stream flow, a detailed comparison of the two drainage basins was made, covering the following points:

1. Precipitation, by weekly means.
2. Prevailing temperatures, by seasonal and annual means.
3. Topography.
4. Geological conditions.
5. The extent of forest cover and general forest conditions.
6. The character of flow of the two streams as shown by continuous discharge measurements made by the Division of Hydrography of the Geological Survey.

These two catchment areas were chosen for the study because they differ widely in the extent and density of their forest cover. Esopus Creek is well timbered, with not more than 15 per cent. of cleared land upon its entire basin. In the basin of the Wallkill, on the other hand, fully 85 per cent. of the land is cleared and under tillage, the remaining forest cover being confined to small, scattered woodlots. The object of the detailed comparison of the two streams, then, in the various respects noted above, was to determine first, as closely as possible, the probable effect of all the other factors, geology, topography, temperature, and rainfall, upon regularity of stream flow. Then, by directly comparing the flow of the two streams under daily measurement in the light of such influence, we should be able to judge whether or not the marked difference in the forested condition of the two basins has any effect upon stream discharge.

The results of this comparative study may be summarized briefly.

1. With regard to precipitation, practically no difference exists between these two drainage basins, either in total amount or in regularity of distribution throughout the year. As shown by records of the United States Weather Bureau, the mean weekly precipitation upon the Esopus basin for the period of three years covered in this study is one inch, and upon the Wallkill basin .97 inches. In each case the average deviation

<sup>1</sup> The Effect of Forest Cover Upon Stream Flow, Part I, General Factors Governing Stream Flow, FORESTRY AND IRRIGATION for June, 1905.

from the weekly mean, which expresses the regularity of precipitation, is about 78 per cent. As far then as this single factor is concerned, no difference between the two streams in regularity of flow may be expected.

2. The same similarity holds in the matter of temperature which has an important bearing upon stream flow through its influence upon evaporation. The seasonal and annual means are practically the same for the two drainage areas and no difference in stream flow can be attributed to this source.

The Wallkill basin is, in effect, a broad, rolling valley of very moderate slopes. This stream drains a region of non-resistant shales and limestones which have been eroded into a series of level, winding valleys, separated by low, gentle divides, 600 to 900 feet in height. The valleys follow the softer limestone areas, while the low divides mark the outcrops of harder shale. The average grade of slope of the entire basin is 6.68 per cent. and the average fall of the stream 10 feet per mile, two facts which summarize in themselves the undulating charac-



The Upper Wallkill Basin

3. With reference to the important factor of topography, however, marked differences are found in the two catchment areas. The Wallkill River of southeastern New York drains the valley region of the Appalachian belt, a region of old geological formations, worn down by prolonged erosion, and of low, rolling topography. Esopus Creek, on the other hand, drains the Catskill Plateau, a region of much more recent and less eroded geological structure and of steep and rugged topography.

ter and gentle slopes of this watershed.

The catchment area of Esopus Creek, on the other hand, consists very largely of steep mountain slopes. The Catskill region, drained by this stream, is composed in the main of shales and sandstones of comparatively recent origin which have been sharply eroded into a series of high ridges separated by deep, gorge-like valleys. On many of the slopes the resistant rock is exposed as bare, outcropping ledges which often form a

series of terraces from base to summit. On the drainage basin as a whole the grade of slope averages 13.05 per cent. or double that of the Wallkill, and the fall of the stream 59.6 feet per mile, or nearly six times that of the Wallkill. These figures express in themselves the comparatively steep, rugged character of the topography of this basin.

In another important respect these two streams differ widely in topography. That of the Esopus is not only steep and rugged; it is simple and direct in character. The tributary

iate, lies in the facilities for storage by natural reservoirs. Natural reservoirs form a marked feature of the Wallkill basin. The undulating topography, together with the alternation of areas of soft limestone with more resistant shale, have led to the formation of swamps and ponds all over the drainage of this stream. Of special note are the "Drowned Lands" which impede the course of the river at its very source and line the channel of the main stream for many miles. On the entire Wallkill basin 42.52 square miles, or 5.04 per cent. of the



The Lower Wallkill Basin

streams are few in number, comparatively short, and direct in their course. The rolling valley of the Wallkill on the other hand is cut up into a series of long, winding, tributary basins, forming an extensive, complex drainage system with many secondary streams of gentle fall and sluggish current.

A third and still more striking difference in the topographic conditions upon these two basins, and one whose effects upon the character of stream flow are necessity, direct and immed-

total area, are occupied by lakes, ponds, or swamps. Natural reservoirs so well distributed and having so large a total extent, form a factor of prime importance in regulating the flow of the river.

The steep, rugged basin of the Esopus, on the other hand, is practically devoid of natural reservoirs. Swamps and ponds, forming no appreciable part of its entire area, are so limited as to have no effect upon natural storage.

The contrast in topography condi-

tions represented by these two streams may then be roughly stated as follows:

1. The slope of the Esopus basins are twice as steep as those of the Wallkill.

2. The fall of the Esopus is six times as rapid as that of the Wallkill.

3. The topography of the Esopus basin is much more simple and direct than that of the Wallkill.

4. The Esopus has no natural reservoirs, whereas a relatively large percentage of the Wallkill basin consists of swamps and ponds.

With regard to the bearing of these factors upon stream flow, it is evident that in each of these four important respects, the conditions upon the Wallkill basin are much more favorable to underground seepage and equable stream flow than on the Esopus basin. As pointed out in the general discussion of this subject, steep slopes such as those of the Esopus favor the immediate discharge of precipitation as surface run-off with but little underground seepage, while moderate slopes such as those of the Wallkill favor the slow and gradual discharge of precipitation with a maximum of underground seepage. A steep channel and simple, direct topography like that of the Esopus accelerate the discharge of flood waters from all parts of the drainage basin, causing sudden and rapid fluctuations in the flow of the main stream, while a channel of very moderate grade and winding, indirect tributary streams, like those of the Wallkill, have an exactly opposite effect. Of great importance also is the natural storage of flood water in swamps and ponds which we find in such marked degree on the Wallkill basin and which is lacking entirely in the basin of the Esopus. In all four respects, therefore, the Wallkill has a marked advantage over the Esopus in the natural conditions favoring evenness of stream flow. As far as the single factor of topography is concerned we would expect the Wallkill River to be much more reg-

ular in its behavior than the Esopus Creek. If this is not the case, it must clearly be due to the counter influence of some other factor governing stream flow.

4. The fourth factor with respect to which the two catchment areas are to be compared is that of geology. Of the Wallkill basin, fully 80 per cent. consists of Hudson River slates and corniferous limestones. The slate is moderately soft and resistant, approaching often a fine, flaky shale in texture. It forms as a rule the hills and low secondary divides of the basin. The limestone which is associated everywhere with the slate, forming usually the immediate basins of the streams, is soft, porous, and non-resistant to erosion.

These rocks have formed by disintegration deep layers of fine loamy and marly soils, supplying the basin with an excellent surface for absorbing precipitation and converting it into underground seepage. The large areas of soft, porous limestone, moreover, would tend to absorb directly large quantities of water, either storing it and yielding it up gradually to the surface, or allowing it to percolate through into underground water courses and channels of spring supply.

Of the Esopus basin, on the other hand, 90 per cent. consists of thick beds of sandstones, shales, and flags of the Catskill and Hamilton formations. In general these rocks are dense in texture, coarse grained, hard, and resistant to erosion. Their hard, resistant character is shown by the vertical cuts, sheer ledges and generally rough topography of the Esopus basin. The character of the mother rock, combined with the steepness of the mountain slopes, has resulted in the formation of a very thin layer of soil, the rock being at best scantily covered and in many cases entirely exposed. Not only is the absorbing layer of soil which plays such an important part in the storage of precipitation very thin over much of this

basin, but the rock itself from its dense texture and resistant character does not tend to absorb precipitated water but rather to shed it immediately as surface run-off.

In the bearing of geological conditions upon stream flow then, the Wallkill would seem to possess a marked advantage over the Esopus in its deep soil and large area of porous limestone. It is, of course, impossible to define closely the limits of such influence. In general, however, it is evident that, as far as the single factor

hand, the forests have been reduced, in the main to small, scattered woodlots occupying less than 15 per cent. of the entire basin. If forest cover exerts any real influence in equalizing stream flow, the forested Esopus should in this respect possess a marked advantage over the deforested Wallkill.

As between these two streams then the question limits itself to whether forest cover on the one hand or moderate topography, extensive natural reservoirs, and favorable geological



The Upper Esopus Basin

of geology is concerned, the flow of the Wallkill should be more constant and equable than the flow of the Esopus.

5. The marked difference between these two basins in the extent and uniformity of forest cover has already been noted. The headwaters of the Esopus and of all of its principal tributaries are covered by continuous and unbroken forest, including 85 per cent. of the total catchment area. In the valley of the Wallkill, on the other

conditions on the other exert the greater relative influence in storing precipitation and equalizing stream discharge.

This question can be answered by a comparative study of the behavior of the two streams under daily measurement. The discharge measurements of the two basins, made by the Division of Hydrography of the Geological Survey, were computed by weekly means for the three years from 1901 to 1903 inclusive. The

average weekly mean of each stream for the entire period was then obtained. The percentage deviation from this mean, above or below, for each week in the three years and the average deviation for the entire period were then calculated for each stream. The average deviation from the mean flow thus obtained should give us a ready means of comparing directly the variations of the two streams and

moderate topography, natural reservoirs, and favorable geological conditions of the Wallkill is somewhat stronger in promoting evenness of stream flow than the compact forest cover of the Esopus basin. At the same time the margin of difference between the regularity of the two streams is so small as to establish beyond doubt that the forest cover of the Esopus does exert a strong con-



The Esopus at Big Indian, N. Y.

the relative evenness and uniformity of their discharge.

It was thus found that the average deviation from the mean weekly flow is 78.24 per cent. in the case of the Wallkill and 83.69 per cent. in the case of the Esopus, the latter thus showing a slightly more irregular discharge than the former. The conclusion to which we are thus brought is that the combined influence of the

serving and regulating influence upon the flow of that stream. This is especially true when we recall how unfavorable the other factors of topography and geology upon that catchment area are to equable stream flow. The forest cover of the Esopus thus appears to overcome to a large degree the unfavorable effects of steep topography, hard and dense surface rocks, and marked deficiency in natural stor-



age facilities. It reduces the flow of that mountain stream to a regularity almost equal to that of a lowland type of stream where exactly opposite topography conditions prevail. That the deforestation of a mountainous basin like that of the Esopus must, therefore, greatly increase the irregularity of stream flow there can be no doubt. In other words, the compact forest cover of the Esopus has the same general equalizing effect as the moderate topography, natural reservoirs, and favorable geological conditions of the Wallkill.

As far then as the investigation of these two basins will permit, a general conclusion may be stated as follows:

Conditions of temperature and precipitation being the same, the relative regularity of stream flow from different drainage basins will be determined

First, by the topographic and geological conditions and facilities for natural storage in swamps and ponds. This factor must be placed first as having the more general and far reaching importance.

Second, by the character and extent of forest cover. Forest cover, while secondary as a factor governing stream flow to the first named, exerts a very direct and powerful influence in moderating the effects of the first factor when unfavorable to equable stream flow, and in aiding and extending its influence when favorable.

## THE RECLAMATION SERVICE

### Progress of Government Irrigation in the Western States and Territories

#### Work on Salt River Project

The heavy rains and excessive and unusual spring floods in Arizona greatly retarded the work of the reclamation engineers, but during the month of May most of the damage to roads was repaired. Although the water had gradually subsided for several weeks, the flow of Salt River on June 2 was thirty times that of the same day last year.

Work has progressed rapidly despite the fact that until the latter part of May it was necessary to ferry all lumber from the mill and supplies for the mill near Livingstone. The capacity of the saw mill in connection with the Salt River project has been increased to nearly 11,000 feet per day, and the lumber is being moved to Roosevelt as rapidly as possible. Sixty teams hauling continually are required to keep up to the output of the mill.

Progress on the tunnel at the power

plant is being made at the rate of about 8 feet of finished tunnel per day. Cement manufactured at the cement mill has been furnished to contractors since the early part of May, and the quality of the output is very satisfactory. Work on the power canal has progressed slowly on account of scarcity of available men and teams.

During the past month a number of contracts for the purchase of land have been made, and the Secretary of the Interior has approved the purchase of other tracts.

A contour map showing the condition of underground water in the Salt River Valley was prepared this spring, and since the floods a new set of maps with contours representing the new position of the water plane has been drawn.

Reconnaissance surveys of Pinto Creek and the San Carlos project have

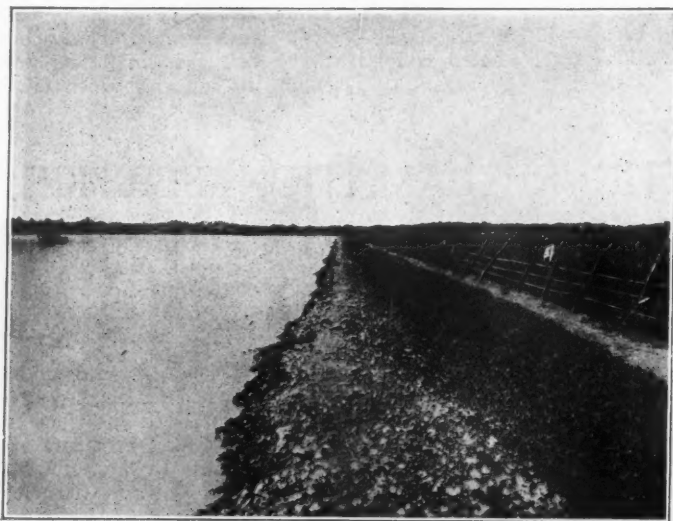
been made, and estimates of power canal tunnels and concrete structures have been made in the office.

#### **The Kremmling Reservoir Site**

In reply to questions regarding the Gore Canon, Mr. F. H. Newell, chief engineer of the Reclamation Service, stated that this matter was one among a large number of important questions which had come to his notice in connection with reservoir sites in the various parts of the United States. The information attained leads to the belief that this reservoir site is unique

fit to Colorado.

As regards the railroad right of way, this matter has been fully discussed before the department at Washington, hearings being had by the Assistant Attorney General, and all of the evidence presented by the railroad has been given careful consideration. As a result of a study of the evidence presented and of the arguments offered by the railroad, the Secretary of the Interior has concluded that it is his duty to protect the irrigation interests and has referred the matter to the Department of Justice.



Colorado River Overflow below Yuma, Arizona

in that there is a very large storage capacity combined with economy of construction of the dam and a large volume of water available for storage.

The study of the entire drainage basin of Colorado River shows that it will be necessary to utilize the Kremmling reservoir site in the development of arid lands in Colorado and further down along the stream. The flow of Grand River at Grand Junction drops in summer to an amount below the needs of the irrigable lands in the vicinity, and the construction of the reservoir will be of great bene-

An analysis of the facts presented leads to the belief that a suitable railroad location can be found without destroying the Kremmling reservoir. If the reservoir were already built there is no question but that the railroad would find a way around it and would not contend that the existence of the reservoir blocked railroad development.

In short, the following contentions are believed to be susceptible of proof when the proper time arrives:

First—That a feasible route for the railroad exists avoiding the reservoir

and the dam site in Gore Canon.

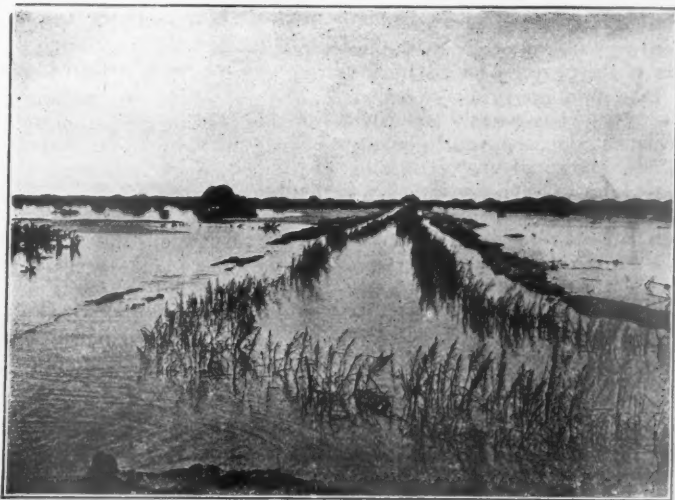
Second—That public interest demands that the government shall not sacrifice the Kremmling reservoir on the facts presented.

Third—It is simply a question of time when the railroad and the reservoir will be built and successfully operated, giving Colorado the advantage of all natural resources without depriving the public lands along the Grand and Colorado Rivers of the needed quantity of water.

The matter being now in the hands of the Department of Justice it is not

be used to the most complete extent in irrigation development in Colorado and elsewhere.

The value of the Kremmling reservoir site was recognized, as the results of surveys demonstrated the impracticability of storage elsewhere. The careful studies of the entire situation made by Mr. A. L. Fellows brought forward clearly the necessities for holding the Kremmling site. His efforts on behalf of the public interests are very highly appreciated by the government officials and too much cannot be said in praise of the con-



Colorado River Annual Inundation

permissible for the engineers to discuss the details or the evidence presented. The government has already spent large amounts of money in surveys and explorations along the Colorado River and its tributaries, and is now engaged in expensive construction work on the lower river, the success of which depends largely upon the utilization of the Kremmling reservoir. Steps have been taken to protect the rights of the public in this reservoir in order that its waters may

scientific attitude take by Mr. Fellows in his advocacy of the best public interest of the State of Colorado. Although not now connected with the Reclamation Service, Mr. Fellows' judgment and opinions on matters concerning the water supply in the State of Colorado are accepted as of the highest value and his services for the state and government are known to be those of an unusually conscientious, far-sighted engineer.

### North Platte Project

A recent visit of representatives of the Reclamation Service to the North Platte project in Nebraska-Wyoming shows that the situation is quite encouraging.

Contracts for the first section of the canal for a length of about 45 miles have been awarded by the Secretary of the Interior and the contractor expects to begin work at once.

The people themselves are now very actively perfecting the organization of the Water Users' Association in order that they may cooperate with the United States Government in the working out of the project.

A local difficulty has arisen which, however, will not interfere with the progress of the government. This involves two questions: (1) Whether the government has a right to water its own lands which happen to be situated under the canal proposed to be constructed by private parties as an extension of the old Farmers' Canal, no construction having been begun by them during the eight years since they first placed their plans of record under the local statutes; (2) Whether the government can furnish water to lands in private ownership under this same proposed canal extension.

These are questions of law which are now before the courts, and will be settled between the United States Government and the parties claiming rights under the old canal location.

As the matter is one between the United States and those proposing to construct this canal, it will not prevent those owning the lands under the proposed canal from applying to the government for water rights. If the courts should hold adversely to the rights of the government to furnish water for these lands, all contracts which have been made with the government will necessarily be cancelled, and the parties who have made application for water will be left in no worse situation than they were before.

With this understanding, those par-

ties who are affected by this phase of the question are arranging to join the Water Users' Association, which is to be recognized by the government as the representative of the water users, and will make application to the United States for water rights when announcement shall be made that the government is ready to receive them. The adjustment of the legal questions will be left to the courts.

The people in general are enthusiastically in favor of the government project, and all land owners in the valley are preparing to become members of the Water Users' Association, including nearly all of those under the proposed extension of the Farmers' Canal.

### To Reclaim Alkali Lands

An interesting and important investigation is being carried on by the Reclamation Service, to determine the best method of reclaiming the alkali lands under the Truckee-Carson project, Nevada.

The plan entails the installing of ten acres of alkali land—typical in texture of the general farm lands now being entered by farmers—with under drains, for the purpose of leaching out the alkali, and the preparation of another ten acres of land for flooding copiously with water, without under drains being previously laid. It is intended that the work on the first ten acres will demonstrate the advisability of reclaiming alkali lands with under drains, and determine the approximate cost for such work per acre. The work on the second ten acres should determine the possibility of reclaiming these lands from alkali without under drains being previously laid. The lands selected are not only typical farm lands met with in this, but in other projects, and are threatened with alkali accumulation.

The data collected will be of value to the farming interests in that the results will demonstrate the best process for handling farm lands which are too salty for profitable cultivation, and which are met with in several parts of

the arid region. In connection with the drainage systems installed by the engineers on the project, it will offer valuable information relative to the efficiency of such drainage systems.

Beside the two tracts above mentioned, land has been selected for the installation of under drains on a third ten acre tract. This selection represents typical alkali conditions for the heavy adobe lands lying in large bodies in the flats of the Truckee-Carson project. Should it be found possible to reclaim these lands at a reasonable cost, it is believed that the land available for farm entry under this project would be increased by many thousand acres.

This investigation is of great importance from a financial standpoint, in that a comparatively small cost per acre for relief from alkali may make possible the reclamation of large bodies of land under the system, which are now unfit for cultivation.

Drainage conditions are also being studied in connection with the Klamath, Minidoka and Huntley projects, and work on soil classification is being generally carried on throughout the field of operations of the service.

#### **Assistance Asked in Southern California**

A copy of the preamble and resolutions adopted by the San Diego Chamber of Commerce, California, at a recent meeting of that body, has been forwarded to the Director of the U. S. Geological Survey by Senator Perkins.

These resolutions deal with the question of water resources of the western slope of San Diego county, and recite that extraordinary opportunities are afforded for the storage of flood waters. So erratic are the courses of the streams of that section, so much do the watersheds overlap, that it is the sense of the board that a solution of the water supply problem can only be solved by a united irrigation system, planned as a whole and yet so arranged that each district can be formed separately, although

remaining a part of the whole. A request is made that the engineers of the Reclamation Service be assigned to the duty of ascertaining the facts in the case.

The enthusiasm and persistence of the citizens of California in developing their state through irrigation is a source of inspiration. Except in certain localities there is not in California the absolute necessity for irrigation that exists in most Western states and territories. On nearly all the irrigated lands of the state some crops will grow without the artificial application of water, yet the irrigation systems of California are known all over the world. Southern California leads the United States in the scientific and diversified methods of distribution, application and development of water supplies, and in the expensive character of its irrigation works.

That the citizens of that state appreciate the work of the Reclamation Service is evidenced in their desire to coöperate in every possible way, and in the great number of petitions and resolutions which are being constantly received.

#### **Bismarck Project Delayed**

The indifference displayed by the land owners has greatly delayed the progress of the Bismarck irrigation project, and their apparent lack of interest is jeopardizing the entire work.

It is necessary before construction can begin to obtain an agreement from the land owners to abide by the conditions of the Reclamation law in regard to the subdivision of the land and the repayment of the actual cost of irrigation to the reclamation fund. Any further delay in forming a water users' association will make it necessary to withdraw the field parties and transfer operations to other projects for the present at least.

The Secretary of the Interior provisionally set aside the sum of \$550,000 for the construction of the Bismarck project, and plans have been under consideration for greatly extending



the irrigable area by the erection of a central power station convenient to the coal supply, transmitting the power electrically to pumping plants farther down.

An enormous increase in property values and the insurance of good crops every year would result from the construction of this work, and it would be a matter greatly to be regretted if continued neglect on the part of the land owners to embrace their opportunities should make it necessary to transfer operations to other localities.

#### **Progress on the Shoshone Works**

High water in the river has interfered materially with work on the Shoshone project, Wyoming, this spring, and necessitated moving the main camp to higher ground. Borings at the dam site in Shoshone Canyon and along the line of the Corbett diversion tunnel have been practically completed, surveys for the final location of the canal between the tunnel and Ralston made, and road grading above the main dam begun.

It is proposed to complete work on the wagon road through Shoshone Canyon at an early date and construct the temporary buildings at the Corbett diversion dam site. A telephone system consisting of about six miles of line will greatly facilitate the work. Topographic surveys of irrigable land will be carried on during the summer and final location of canal lines made.

Borings along the line of the diversion tunnel on the south side of the river will be commenced in a short time, and it is hoped that the preparation of farm unit maps may be made during the summer.

#### **Poor Postal Facilities Delay Work**

Engineers of the Reclamation Service at Glendive, Montana, are experiencing much inconvenience and delay in the work on the Fort Buford project, by reason of the inadequate mail facilities, and a postoffice inspector has been looking over the situation.

It is deemed advisable that a post-

office be established at Neil Stewart's ranch, which is on the stage line 20 miles from Glendive and one mile from the headworks, where a permanent camp is established, and that the mail service between Glendive and Mondak be improved.

At present it takes a week to send mail to Mondak and get reply, a distance of 50 miles, and a great deal of business is carried on at that point. The service to Glendive is also exceedingly bad.

The contractors will have large camps in the vicinity of the Stewart ranch, and several families would also get their mail there. The matter has been taken up with the department, and it is hoped that satisfactory arrangements will be made in the near future.

#### **Bids Opened and Contracts Let**

Bids for the construction of Laguna dam, Yuma project, California, were publicly opened at the office of the Reclamation Service, Los Angeles, California, at 2 p. m., on June 5, 1905. Eight regular bids were received, as follows:

J. C. White & Co., New York City, \$797,650.00.

Burrell Const. Co., Oakland, Cal., \$799,550.00.

P. McDonnell, Duluth, Minn., \$823,660.00.

City Street Imp. Co., San Francisco, Cal., \$829,519.50.

Cotton Bros. & Co., Oakland, Cal., \$847,675.00.

R. W. Faris, Boise, Idaho, \$862,000.00.

Pacific Const. Co., San Francisco, Cal., \$866,560.00.

N. S. Sherman Machinery Co., Oklahoma City, Oklahoma, \$1,030,117.50.

These bids have been transmitted to the Secretary of the Interior for his consideration.

The project board recommended the construction of a dyke as a part of the irrigation and reclamation works. This dyke is believed necessary for the diversion of the flood waters of the Colorado River from the irrigable lands in



Yuma Valley, it being in effect a prolongation of the Laguna dam for diverting such flood waters from such lands.

As a result of the above recommendation the Secretary of the Interior has advertised for proposals for the construction of about 12 miles of dyke, involving the excavation of about 445,000 cubic yards of earth, and clearing 125 acres of land. Specifications, forms of proposal and plans may be obtained from the Chief Engineer of the Reclamation Service, Washington, D. C., from the Supervising Engineer, Los Angeles, California, and from the Engineer of the Reclamation Service, Yuma, Arizona.

These bids will be received at the office of the Supervising Engineer of the U. S. Reclamation Service, at Los Angeles, California, until 2 o'clock p. m., August 17, 1905.

The Yuma project is one of the most interesting undertaken by the government up to the present time, involving as it does an extensive system of drainage and levees, unique engineering features for the disposal of silt, and a tunnel to carry the irrigating water under the bed of the Gila River. The engineers have under consideration a plan to install pumps for lifting water to 25,000 acres of exceedingly fertile mesa land southeast of Yuma. Three million dollars have been set aside for the construction of the works, and it is estimated that 85,000 acres can be reclaimed thereby.

A special act of Congress was necessary to authorize the construction of the Yuma project on the lower Colorado River, as this river is a navigable stream, and complicated international questions were involved.

The bottom lands are of great fertility, having been enriched for centuries by the silt washed down from the mountains by the Colorado River. The mesa lands are particularly adapted to the cultivation of early fruits, including the citrus varieties, and early vegetables. Probably the earliest veg-

etables in the United States can be furnished from these mesa lands when properly irrigated. On account of the possibilities of intensive cultivation the farm units probably will be forty acres.

The Secretary of the Interior has executed a contract with the Gila Valley, Globe and Northern Railway Company whereby the above named company agrees to make special freight rates on material and machinery to be used in the construction of irrigation projects under the act of June 17, 1902 (32 Stat. 388).

These reductions in freight rates are made in view of the fact that the government irrigation systems on or tributary to the lines of the railroad company will be of great benefit to the country traversed by those lines, and to all parties doing business therein. The money thus saved will be covered into the reclamation fund and will reduce the cost of construction and promote the development and settlement of the lands under the project.

Bids for the construction of the distributing system of the Minidoka project, Idaho, and also for a pole line and telephone system in connection with the same project, were opened at Boise, Idaho, yesterday. The lowest bids for sections of the distributing system, which consists of about 21 miles of main canals and 102 miles of branches and laterals, were as follows:

Orman & Crook, Pueblo, Colo., schedules 1, 5, 6, and 7.

Hubbard & Carlson, Boise, Idaho, Number 2.

Monarch & Porter, Des Moines, Iowa, schedules 3 and 4.

Vulcan Iron Works, Chicago, 8. Total of lowest bids, \$680,000. Fourteen bids were received.

The lowest bids on the pole line and telephone system was that of Crumb & Co., of Iowa—\$6,335.

The Secretary of the Interior has executed a contract and approved the bond of James O'Connor for the construction and completion of division 8 of the Interstate canal, North Platte

project, Nebraska. This division consists of 4 miles of canal.

Six bids were received by the Reclamation Service for the construction of outlet and regulating works and bridge at the outlet of Lake Tahoe, California, in connection with the Truckee-Carson project, Nevada, and the Secretary of the Interior has awarded the contract to Mr. Edward Malley, of San Francisco, whose bid, \$32,200, was the lowest.

Some misapprehension seems to exist in the minds of certain riparian owners as to the effect of these works on their property. The work as outlined is designed to utilize the lake between high and low water levels as they have been known to exist for many years, and the plans involve a regulation of the lake within a limit of six feet, which is within the range of seven feet five inches, the natural fluctuation as shown by actual measurements. The natural beauties of the lake will not be interfered with, and it is not the purpose or intention of the engineers to interfere with private rights along the lake shores.

The Secretary of the Interior has awarded contracts for the construction of canals, branches and structures, and telephone system, in connection with the Minidoka project, to the lowest bidders, as follows:

Telephone system, W. H. Crumb & Co., Chicago, Ill., \$6,335.

Schedules 1, 5, 6 and 7, canal and bridge work, Orman & Crook, Pueblo, Colorado, \$354,823.02.

Schedule 2, 34.3 miles of branches and laterals, Hubbard & Carlson, Boise, Idaho, \$121,494.00.

Schedules 3 and 4, 43.3 miles branches and laterals, Monarch & Porter, Des Moines, Iowa, \$194,836.75.

Schedule 8, cast iron and steel in gates and lifting devices, Vulcan Iron Works, Chicago, Ill., \$9,471.18.

Five bids were received for the construction of the telephone system, and on canals, branches and structures fourteen bids were received.

#### **Bids Wanted by Department of Interior**

The Secretary of the Interior has advertised for proposals for the construction of a group of six frame buildings at Wyncott, Wyoming, in connection with the North Platte project. These buildings are to be used as headquarters of the U. S. Reclamation Service and will consist of residence for the project engineer, main office building, dormitory, mess house, stable, and offices of resident engineer.

The site was donated by residents of Wyncote and is located about half a mile from the railroad station.

A board of consulting engineers of the U. S. Reclamation Service held a meeting in May and recommended plans and specifications for about 8 miles of the South canal, Uncompahgre Valley project, and the Secretary of the Interior has advertised for bids for its construction. The building of this distributing canal will involve the excavation of 525,000 cubic yards of material and the placing of 20,000 cubic yards of concrete masonry for the conveyance and partial distribution of 1,300 cubic feet of water per second from the mouth of Gunnison Tunnel, near Cedar Creek, to a point on the Uncompahgre River 9 miles south of Montrose, Colorado. The bids will be received at the office of the U. S. Reclamation Service, Montrose, Colo., until Aug. 28, 1905.

Surveys have been made covering the uncompleted work necessary for the East and West canals and the South canal is nearing completion. The office building at Montrose will be erected during the summer. Since the Taylor-Moore Construction Company relinquished their contract on the Gunnison tunnel on May 27, the work has been carried on by force account, but revised plans and specifications are being considered for the reletting of the tunnel contract.

The Secretary of the Interior is advertising for bids for furnishing 600,000 pounds of square steel bars for use

in connection with the Fort Buford project, North Dakota and Montana. These proposals will be received at the office of the engineer of the U. S. Reclamation Service, Glendive, Montana, until August 21, 1905.

Bids were opened on June 1st for the construction of the headworks and 34 miles of canal, together with the necessary conduits, spillways, sluiceways, and other structures, and also for 70 miles of telephone line. A contract between Lower Yellowstone Water Users' Association and the Secretary of the Interior has been signed by the president and secretary of the Association and will soon be submitted to the department.

Field parties are at work revising and cross sectioning the 34 miles of canal line preparatory to construction, and other parties are locating the lateral system. A soil survey is being made with a view of determining the farm units. As soon as the location of the lateral system has reached a point where plans and specifications can be drawn, bids will be asked for its construction, and a dam across Yellowstone River will be advertised at about the same time.

As much of the land to be irrigated by this system lies on the benches about 90 feet above the river, it will be necessary to raise the water in the river about 5 feet at the headgates by means of the diversion dam. At the point of diversion, about 19 miles north of Glendive, Mont., the river is rather shallow and has suitable foundations for a low dam, which will be so located as to permit the canal to be taken out in a tunnel, thus placing the headgates where they will be protected from the shock of large ice gorges which cause considerable damage along the river every few years.

This project is surrounded by one of the finest and largest grazing regions in the West. The stock requires feeding three months of the year, and the quantity of feed available determines the amount of stock that can profitably be raised. With this tract of land irrigated and alfalfa and other forage crops extensively

grown, this will be one of the largest stock feeding points in the West.

The Secretary of the Interior has advertised for proposals to furnish from twelve to sixteen thousand barrels of Portland cement for the Fort Buford project, North Dakota and Montana.

The bids will be received at the office of the Engineer of the U. S. Reclamation Service at Glendive, Montana, until July 31, and particulars may be obtained by application to the Chief Engineer, U. S. Reclamation Service, Washington, D. C., or to F. E. Weymouth, Engineer, U. S. Geological Survey, Glendive, Montana.

Bids for the construction of the Pathfinder dam, in connection with the North Platte project, Wyoming, were opened at Denver June 16, and the lowest bid was found to be that of W. C. Bradbury—\$364,940.

The Secretary of the Interior has also advertised for bids for the construction of a pile bridge 350 feet long across the North Platte River, about 25 miles southwest of Casper, Wyoming. Cement and other material for the dam and related works are to be delivered at Casper, and the proposed bridge is on the shortest route by 10 miles between that point and the Pathfinder dam.

The route by the bridge passes through a country where feed for stock is grown, so that feeding stations can be established at points along the road without the expense of hauling fodder a great distance. There is also a telephone line in operation along the route which will soon be extended to the dam site, and the road is in a condition to be easily repaired. The Chicago and Northwestern Railroad and the County Commissioners of Natrona county have signified a willingness to make the needed repairs.

The direct advantage which will result from the construction of the bridge and the consequent shortening of the route over which cement and supplies must be hauled, should materially reduce the cost of the dam.

# THE FOREST SERVICE

## Outline of Work Now Being Carried on by Federal Government in Various Sections of the Country

### Regulation of Forest Reserves

Mr. Gifford Pinchot, Forester, U. S. Department of Agriculture, has completed a draft of regulations and instructions for the use of forest reserves, which has been approved by the Secretary of Agriculture. The regulations recently issued went into effect July 1, 1905.

The first paragraph declares:

"Forest reserves are for the purpose of preserving a perpetual supply of timber for home industries, preventing destruction of the forest cover which regulates the flow of streams, and protecting local residents from unfair competition in the use of forest and range. They are patrolled and protected, at government expense, for the benefit of the community and the home builder."

Another section of the regulations announces that:

"The administration of forest reserves is not for the benefit of the government, but of the people. The revenue derived from them goes, not into the general fund of the United States, but toward maintaining upon the reserves a force of men organized to serve the public interests. This force has three chief duties: To protect the reserves against fire, to assist the people in their use, and to see that they are properly used.

"Forest officers, therefore, are servants of the people. They must obey instructions and enforce the regulations for the protection of the reserves without fear or favor, and must not allow personal or temporary interests to weigh against the permanent good of the reserves; but it is no less their duty to encourage and assist legitimate enterprises. They must answer all inquiries concerning reserve methods fully and cheerfully, and be at

least as prompt and courteous in the conduct of reserve business as they would in private business.

"They must make every effort to prevent the misunderstanding and violation of reserve regulations by giving information fully and freely. The object should be to prevent mistakes rather than to have to punish those who make them. Information should be given tactfully, by advice, and not by offensive warnings.

"Forest officers will be required to be thoroughly familiar with every part of this book, and to instruct the public and assist in making application for the use of the reserves."

### Special Privileges in Forest Reserves

The new regulations for the use of forest reserves, noted above, contain the following rules governing special occupancy privileges:

Hotels, stores, mills, summer residences, and similar establishments will be allowed upon reserve lands wherever the demand is legitimate and consistent and convenient with the best interests of the reserve.

The use of tracts not to exceed two acres for schools and one acre for churches is specifically provided for by law, subject to regulation by the department and any other disposition of the land by the government. Timber for the construction of church and school buildings may be secured under the free use and sales regulations.

Application for special occupancy privilege must be made to the supervisor, who will transmit it, with report and recommendation, to the forester. The forester may approve the application, with such restrictions as to area, time, terms, and surety as he may deem best, and may extend or renew any permit in his discretion.

Wagon roads and trails may be constructed, changed, widened, extended, or repaired upon forest reserve lands when needed, but permit or right of way must first be secured. Permits will not give the right to exclusive use, or to charge toll, or against future disposal of the land by the United States. Applications must be made directly to the supervisor or through a ranger; never to the Washington office.

Permits for canals, ditches, flumes, pipe lines, tunnels, dams, tanks, and reservoirs, not for mining or municipal purposes, nor granting an easement, are under the jurisdiction of the Secretary of Agriculture and should be applied for to the supervisor, as in the case of roads and trails.

If the project is small and of a private and personal character—such as a reservoir, pipe line, or ditch to supply a few farms, or a tank to collect water for stock—and the supervisor is certain that there are no complications of title, nor prior and conflicting rights, he may approve the application. If any large or commercial enterprise is involved, or if there is any question of conflicting rights or of the jurisdiction of the United States over the land, or of conflict with Federal, State, or Territorial laws controlling use and appropriation of water, the supervisor must transmit the application to the forester for approval, together with report and recommendation.

Permits for private railroads and tramroads and telegraph, telephone, and power lines may be granted only by the forester. Applications may be made to the supervisor in the manner prescribed for road and trail applications. Accurate map of the proposed line must be supplied by the applicant.

#### **Studying Iowa Planted Groves**

The plan for the study of planted groves in Iowa, which is to be undertaken this season, has been prepared. The work will be carried on in coöperation between the Bureau of Forestry and the Iowa State College. The field operations will be under the direction of the forester of the Agricul-

tural Department of the College. These investigations will be made to determine on the basis of existing groves the best species and best cultural methods for the region covered. The field party will consist of five men, who will travel in wagons over a carefully planned route. Many hundred typical groves will be visited and measurements taken as to the rate of growth and yield of the various plantations. Species will be studied as to their behavior when planted alone or in mixture, and careful consideration will be given the economic value of each. To make the study of the region complete certain small bodies of natural timber found along these natural groves can be depended upon to supply the local needs, and as to the suitability of the native species for planting. The value of forest plantations to the farmers of Iowa for the purposes of protection and fuel supply is thoroughly appreciated, and this investigation is receiving every encouragement from the people of the region.

#### **Creosoting Telegraph Poles**

The Bureau of Forestry has attained great success at Dover, N. J., in impregnating the butts of telegraph and telephone poles with creosote. A tank designed by the Bureau is used, in which the poles are placed at an angle of about 20 degrees. This allows the creosote to cover about 10 feet of the pole. The poles are boiled in the creosote for several hours, and then transferred to similar tanks filled with cold creosote, where they remain about the same length of time. It is found that the creosote penetrates the wood a half inch or more, and the absorption per pole is 35 to 40 pounds. The treatment will undoubtedly double the natural life of the pole. Creosote is expensive, and this plan is much cheaper than to impregnate the whole pole with about 250 or 300 pounds, as has been done. As the entire value of the treatment is reached when about 8 feet of the pole is preserved, the value of this work by the



Bureau is apparent. The work will be completed this week at Dover, but will be continued for the next two weeks at Thorndale, Pa.

#### **Example of Profit in Forestry**

The Medicine Bow Forest Reserve in Wyoming is furnishing a good example of what can be done by practical work in the national forests. The reserve was created about three years ago, and in the last two years the cash receipts for timber have been \$25,449.61. Another sale of \$10,000 worth of timber is just being completed. The timber is largely lodgepole pine with some Englemann spruce, and it is being cut for railroad ties, mine props, and a little for lumber. The supply in this reserve is very large, and with judicious management may be made continuous. The present cutting is only a proper thinning of the forest, taking trees that can well be spared, and the condition of the forest is being improved. All the cutting has been done by the same contractors and the work has been of the highest character. There has not been the slightest friction in the enforcement of government cutting regulations, nor has there been a day's delay in the payment for timber sold.

#### **Tree Planting in Southern California**

The annual report on the forest planting operations which the Bureau of Forestry is carrying on in the San Gabriel Mountains of southern California has reached Washington. It shows very satisfactory progress in all lines. The heavy rains the past season and the large supply of nursery transplants made possible the first extensive planting on the chaparral slopes. In all 35,700 trees were set out. To demonstrate the suitability of various trees, fourteen different species were used, which were set in different types of chaparral growth at altitudes ranging from 2,000 to 2,500 feet. These trees are in good condition and have already started growth. The size of the lath house at the Henninger Flats nursery was increased

one-third, giving 11,520 square feet of seedbeds. This space was sown to seeds this spring and has a capacity of 300,000 one-year-old trees. The seedlings grown in the seedbeds last year were transplanted to nursery beds in open ground in March. The total number transplanted was 210,700, and consisted of ten important species, the most promising of which for mountain planting are big-cone spruce, Coulter, knob-cone, and western yellow pine, and incense cedar. The report shows an increasing public interest in the matter of reforestation and protecting the important watersheds of California. Business men are giving more thought to the subject and it is a matter of discussion in many conventions and public meetings. The Los Angeles Chamber of Commerce has this year contributed \$1,500, and the Pasadena Board of Trade \$500 towards the reforestation work in the San Gabriel Mountains.

#### **Free Use of Timber and Stone**

Regarding the free use of timber and stone, the new regulations for use of the forest reserves contain the following statements:

The law gives the Secretary of Agriculture discretion to allow or refuse the free use of forest reserve timber and stone, under such regulations as he may prescribe, by "bona fide settlers, miners, residents, and prospectors for minerals, for firewood, fencing, building, mining, prospecting, and other domestic purposes as may be needed by such person for such purposes; such timber to be used within the state or territory, respectively, where such reservations may be located, and by the United States."

The free use privilege may be granted to settlers, farmers, prospectors, or similar persons who may not reasonably be required to purchase, and who have not on their own lands or claims, or on lands controlled by them, a sufficient or practicably accessible supply of timber or stone for the purposes named in the law. It may also be granted to school and road



districts, churches, or coöperative organizations of settlers desiring to construct roads, ditches, reservoirs, or similar improvements for mutual or public benefit. Free use of material to be employed in any business will be refused, as, for example, to saw-mill proprietors, owners of large establishments or commercial enterprises, and companies or corporations. The free use privilege will not be given to any trespasser.

Except in cases of great and unusual need, no applicant will be given more than two free use permits in one year, nor may the aggregate amount of material granted in the two permits exceed \$20 in value, except in the case of schools or road districts, churches and non-commercial coöperative organizations, when the supervisor may, in his discretion, extend the amount to any value not exceeding \$100. The duration of any permit will be fixed by the issuing officer, and will not exceed six months. In cases of unusual emergency, however, it may be extended by the supervisor, or, if for \$20 or less, by a ranger authorized to grant free use.

#### **Wood for Street Paving**

On account of the increasing interest in wood as a material for street pavements the Bureau of Forestry will at once make a thorough study of American woods for that purpose. The experience of European and Australian cities indicates that wooden pavements properly laid are superior to such pavements as asphaltum and macadam, in the particulars of coolness, quietness, safety of footing and sanitary qualities.

The sanitary advantages are apt to result only when the wooden blocks are thoroughly creosoted, and in laying are filled in between with creosote and tar. The sanitary influence of creosote is widely known. Its value as a wood preservative is dependent upon its antiseptic and insoluble properties. With wood which has been thoroughly creosoted decay is practically eliminated. The creosoted wood-

en pavement would therefore not prove by any means a hospitable place for disease germs of any kind.

The woods used with the best results for paving in the past have been Australian hardwoods. American woods have not had a wide test in thoroughly well laid pavements. One American hardwood, the red gum, has been tried quite extensively in England with very satisfactory results. There are unquestionably many American woods just as valuable for pavements as any of the Australian hardwoods. The woods which especially commend themselves for paving purposes are northern hardwoods, such as birch, beech, and maple, of which there is a large supply and for which, up to this time, there has not been a ready market. If these woods prove satisfactory their advantage over Australian hardwoods in point of cheapness for use in the United States, will be readily seen. In its investigation the Bureau of Forestry will give its first attention to these woods.

#### **Private and State Rights in Reserves**

The new regulations for the use of forest reserves contain the following rules as to private and state rights in the reserves:

Persons having valid claims under the public land laws, or legal titles to land within forest reserves, are free to occupy and enjoy their holdings, but must not interfere with the purposes for which the reserves are created, and must not cut timber or make use of forest reserve land or rights thereon without a permit, except within the limits of their claims, and there not to the extent of committing trespass.

All questions involving titles to such claims are entirely within the jurisdiction of the Secretary of the Interior.

No land claims can be initiated in a forest reserve except mining claims, which may be sought for, located, developed, and patented in accordance

with law and forest reserve regulations.

Lands owned or claimed by the states or territories within forest reserves are subject to the general rules given above. Indemnity selection may be made by the states and territories for school sections 16 and 36, when within a reserve, and thereupon these sections will become part of the forest reserve.

No right now exists to exchange private holdings within forest reserves for lands elsewhere, except where such right was established in the Interior Department before March 3, 1905, and except the indemnity-selection right with regard to school sections 16 and 36, referred to above.

#### **Will Extend Study of Forest Plantations**

The Bureau of Forestry has planned to extend the scope of its study of forest plantations during the coming season. A large amount of forest planting has been done, especially by various railroad companies with varied success. In many cases the plantations have been failures because they were not planted under expert direction; others through unwise choice of species, too wide spacing, and lack of cultivation have not attained high value. The scheme of the present work is to accumulate all available data regarding railroad plantations and failure, the species which are best suited for railroad planting in different regions, and in short to acquire the data which will enable the Bureau to perform the highest advisory function along all lines of forest planting. The location of existing railroad plantations will be determined through correspondence, and data compiled as to the yield and general character of species already used or which can be recommended, and a field study will be made of the more important plantations in representative regions. The furthering of railroad planting will not only be a step toward insuring a future supply of ties, but will encourage planting by farmers and ranchers

along the railroad lines where large plantations are established.

#### **Examine Potomac Water Shed**

The Forest Service has just started, in cooperation with the Geological Survey, a study of the conditions of the watershed of the Potomac River and its tributaries. The general plan will include a determination of all causes of contamination, as from industrial and domestic sources and because of bare and eroded watersheds. The Forest Service is specially concerned with the last feature.

The tributaries of the Potomac will be critically examined in Virginia, Maryland, West Virginia, and probably in Pennsylvania. Slopes bare, partly cleared, and timbered will be studied, the run off after rains will be compared, and the influence of forest cover in equalizing stream flow investigated. The purpose is to find out and lessen, if possible, the amount of solid matter carried down the river during times of freshets. In this way material aid will be given future filtration of the water for domestic purposes. Mr. W. W. Ashe will be in charge of that part of the study conducted by the Forest Service.

#### **Bids for Reserve Timber**

The Forest Service has received an offer of \$2.50 a thousand feet for 50,000,000 feet of lodgepole pine and Engelmann spruce in the Big Horn Forest Reserve, Wyoming. The timber will be advertised for sale and this bid accepted if none higher is made. This means at least \$125,000 for this timber, which will be used largely for railroad ties and mine props.

Hitherto sales of timber in that region have been of small quantities and strictly for local use, and \$1 a thousand feet has been the average price received. The recent congressional enactment permitting, with two exceptions, the export of timber from the state where the reserve is located, makes possible such large sales as the present. It also materially helps the price of government timber.

This 50,000,000 feet will be cut strictly under the new regulations of the Forest Service, which means in such a way that only the dead and mature timber will be used, that the forest will be protected from fire, and the seed trees and young growth guarded so that the future productivity of the forest will be assured. Unless this sale were made, much of this timber would die and disappear, without benefit to the government or any one else.

#### **Kiln-Drying Lumber**

The Forest Service is beginning a study of the methods and results of the kiln drying of lumber. This has been a perplexing question, both to the manufacturers and dealers in lumber, and some kinds of timber have been found exceedingly difficult to season by ordinary kiln-drying methods. There is also little definite information as to what degree of dryness is attained under ordinary methods, and exactly what the influence of the process is on the quality of the lumber.

In connection with the field study, there will be made at the New Haven laboratory of the Forest Service a very careful series of tests of the effect on timber of seasoning under different conditions, such as through air seasoning, through dry heat, and through steam. It is expected that this study will do much towards putting the kiln-drying of lumber on a definite scientific basis.

#### **Basket Willow Culture**

An interesting development in connection with the investigation which the Forest Service is conducting on the basket willow culture is the flooding of its willow holts for the purpose of destroying such insects injurious to willow as pass a portion of their lives in or near the ground. The Service has an extensive plantation of standard strains of basket willow, the yield and utility of which is being tested under different systems of culture. A number of the most promising varie-

ties are attacked from time to time by various willow insects, greatly damaging the fine commercial quality of the rods. Widespread injury of this kind has already prevented the profitable growth of the best kinds of basket willows in many sections of the United States, particularly in the South. A part of the government willow plantation has just been surrounded by a specially constructed dike which will permit the flooding of the ground for any length of time required to destroy insects in or near the ground. It is proposed to turn water upon the affected willows at a time when the insects are near the roots of the plants. This means of control does not apply to all of the willow insects which pass all of their lives above ground on or in the twigs. Certain species, however, go to the ground or into it for transformation, and others hibernate in or near the ground. It is expected that winter flooding will destroy the latter, and it is hoped that seasonable summer floodings will destroy many of the former.

#### **Studying Loblolly Pine**

The importance of the export trade in loblolly pine and the need of presenting accurate information to the foreign importers, has led the Forest Service to investigate the mechanical properties of this timber at the mill. A testing machine is installed at the mill of the E. P. Burton Lumber Company, at Charleston, S. C., and, under the supervision of the forester of the company, trees are selected in the forest and transported to the mill before sawing so as to yield test pieces which will furnish the required data with the least expenditure of effort and with the least consumption of material. In addition to collecting accurate data of the properties of this timber, the work will be directed to ascertaining the best kind of growth, and the conditions under which the best growth can be obtained. As the holdings of the Burton Company are under conservative forest management, it is evident that the testing

work at the mill will serve the general interests of the forestry movement.

**Applications for Use of Forest Reserves**

A very clear idea of what various uses are made of the national forest reserves may be had from the following applications received by the Forest Service:

M. E. Field, of Stehekin, Washington, has been granted permission by the Forest Service to conduct a hotel at the mouth of Bridge Creek in the Washington Forest Reserve.

The application of Charles P. Mallory, of Grand Junction, Colorado, for permission to build a log cabin to be used as a summer residence, in the Battlement Mesa Reserve, Colorado, has been approved.

G. M. Parrish, M. D., of Chelan, Washington, has been granted permission to conduct a sanitarium at the mouth of Prince Creek, north shore of Lake Chelan, in the Washington Forest Reserve.

An application of the Kern River Company, Los Angeles, California, has been approved for a ditch and pumping plant right of way in the Sierra Forest Reserve (Southern Division), California.

The application of A. J. Samstag, of Farmersville, California, for permission to build a cabin in the Sierra Forest Reserve, has been approved.

The Forest Service has approved the application of L. B. Sperry, of Oberlin, Ohio, for permission to construct a trail from Glacier Camp to Mary Baker Lake, in the Lewis and Clark Forest Reserve, Montana.

The application of W. M. Finley, of Elk City, Idaho, for permission to conduct a public stopping place at the confluence of Red River and Moose Creek, in the Bitter Root Forest Reserve, Idaho, has been granted.

The application of the New World Smelting Company, of Seattle, Washington, for permission to build a wagon road in the Absaroka Division of the Yellowstone Forest Reserve, in Montana, has been approved.

The application of Edmund Kelly, of Pagoda, Colorado, for permission to construct an irrigating ditch in the White River Forest Reserve, has been granted.

The Forest Service has approved the application of A. O. MacLeod, of Mazama, Washington, for permission to conduct a public stopping place at Mazama, in the Washington Forest Reserve.

The application of Walter F. Horner, of Brinson, Washington, for the construction of 50 miles of trail along the Docowallip River in the Olympic Forest Reserve, Washington, has been approved.

The Forest Service has approved the application of J. H. Fuller for a corral in the Black Mesa Forest Reserve, Arizona.

The application of Will J. Margorum, of Stehekin, Washington, for the privilege of constructing an irrigating ditch within the Washington Forest Reserve, has been approved.

The Forest Service has approved the application of Frisbie D. Hutchinson for the construction of an irrigation ditch and reservoir in the White River Forest Reserve, Colorado.

The Board of Directors of School District No. 1, Wasco county, Oregon, has been granted permission to erect a school house within the Cascade Range Forest Reserve.

The application of the Mackinaw Mining & Milling Company, of Everett, Washington, for permission to construct a horse tramroad in the Washington Forest Reserve has been approved.

The Forest Service has approved the application of W. D. Wilson, of Newbill, California, for permission to conduct an apiary within the Santa Barbara Forest Reserve.

The application of the Commissioners of Modoc county, California, for permission to improve the public road within the Warner Mountains Forest Reserve has been approved by the Forest Service.

# PRACTICAL FORESTRY IN NEW YORK

BY

E. S. BRUCE

Lumberman, U. S. Forest Service

A REFORMED scalawag often makes a peaceful and law abiding citizen. Then why should not a converted lumberman make a good forester? Not many years ago, I was an active member of that great army, who for nearly 300 years, have been chopping away at our forests with an eye only to immediate profit, and perhaps I am none the worse forester for having been a lumberman.

If we consider details, there are a vast number of ways of handling a forest. If we consider policy, there are only three. One of these is to harvest its product with a view only to present returns. That is the ordinary way, the lumberman's way. It is a policy whose inevitable consequence in the long run, would be the destruction of the forest, and the extinction of the lumber industry.

Another policy in forest utilization is to preserve it by wise use. That is the practical forester's way, and I am glad to say, it is very rapidly growing to be the lumberman's way also. The result of practical forestry, in a word, is the continuous production of a supply of timber which yields good financial returns without depreciating the capital stock—the forest.

Still another policy is to lock the forest up, so to speak—to protect it from fire and other dangers, which is excellent, but to protect it also from any form of utilization, which is foolish. This is neither the lumberman's way nor the forester's way, but the most extravagant policy of all, in its results, although its intention may be entirely praiseworthy. And that is the policy under which our New York State forest is administered. Until the constitutional amendment forbidding the cutting of any state timber

is repealed, we will continue to throw away each year enough money to pay all the expenses of caring for the preserve and to leave above and beyond that a considerable and increasing balance. I fully realize that the constitutional amendment may have saved the Adirondack Preserve from gross misuse in the past, but I am loath to believe that the State of New York is not now in a position to lumber its own forest conservatively, without danger. The preserve is now, as a great health and pleasure resort, yielding returns of incalculable value to the well-being of the state, and consequently of the nation, but before it can fill its full measure of usefulness, it must be made to produce, by skillful and conservative methods, a constant and increasing supply of wood. To lumber the preserve conservatively would not in the slightest degree impair its value as a health and pleasure resort or as a game refuge. Moreover, it would, through utilizing timber which under the present policy will continue to rot upon the ground, furnish permanently the staple upon which the development of local industries, the employment of labor, and in no small measure the continued prosperity of the northern portion of the state, largely depends.

When the conservative man of business has money lying idle, he puts that money to work in a stable enterprise which yields a reasonable profit. He does not bury it in the ground or hide it in the garret. The State of New York is not only failing to put its money out at interest; it is throwing the money itself away. It would be poor business policy for a farmer to raise a crop of wheat and to let it moulder on the stalk rather than to



harvest it. In exactly the same way it is poor business policy for the state of New York to expend large sums annually for the protection of its forests and to let the trees reach maturity, fall, and decay for lack of use. The failure to utilize the product of the Adirondack Preserve is in no sense laying up a store of timber for future generations, for it is a well established fact that production in an untouched forest is practically at a standstill. What is gained by the growth of the thrifty trees is offset by the decay of others, and the total amount of standing timber remains practically the same.

I take the point of view that it is the duty and province of the state, just as it is the duty and province of the individual, to make the most that it legitimately can out of what it has. I am unable to see why timber whose actual growth represents a return of many thousand dollars a year should be wasted, and it should be urged upon every business man, as men of affairs, to give force and direction to the movement to repeal the constitutional amendment which prohibits the conservative removal of any timber for any reason from the state forest.

The state may well follow the example of the Federal government which, upon its sixty-odd million acres of forest reserves is now under the direction of the Forest Service, putting into effect the sale of mature timber, to be removed under conservative regulations.

The average New York citizen has had neither the time nor the opportunity to look up the matter of state forests sufficiently to satisfy himself as to the best policy to pursue. He is chiefly desirous that the state forests be protected and maintained as a perpetual health and pleasure resort, and as a protection for the headwaters of the rivers. He would be pleased to have some system of forest management put in operation which would produce a revenue and make the forests of the state, in a measure, self-

supporting, continue the lumber industry, and furnish employment to a large number of citizens of the state, *provided always* that the system inaugurated should not impair the chief use and beauty of the forests.

To bring about these desirable results, the officials in charge of the state forests must be invested with power and authority to decide what method of treatment will best serve the requirements of each particular tract. They should possess a sufficient knowledge of practical forestry to *know* that the results will justify the course decided upon. They should have the authority, executive ability, financial backing, and the requisite business qualifications to carry out carefully and thoroughly the plans formulated to be pursued upon the different tracts regardless of the criticisms of theorists who disagree with them, and have the stamina to continue such treatment as a careful study of each tract should cause to appear advisable.

Wise management of the state forests must include as a requisite business qualification, and a very necessary one, the ability to determine accurately the value of the timber stumpage on the different tracts according to their locality, and no timber should be disposed of on any state land until a just minimum price has been fixed upon the stumpage to be sold. All timber sales should be thoroughly advertised prior to the sale, in the leading newspapers, then sold to the highest responsible bidder—sealed bids in every case with the right reserved to reject any or all bids, which should be done in every case if no bids exceed the minimum value placed on the stumpage; a bond to be required to insure payment for the stumpage, and the faithful carrying out of the rules and regulations prescribed to govern the cutting and removal of the timber sold.

Judicious management of the state forests would in many instances require the application of several different methods of treatment on one town-



ship, since a policy which would be advisable on one particular portion would not be advisable in another portion of the same township. A wise decision of the method of management and treatment that should be used for the different localities can only be made by men who are not wedded to some favorite theory, but are willing to adopt the method which is most desirable for the particular locality upon which they are engaged, who can lose sight of self and theory entirely, and after carefully looking over a tract, decide impartially and wisely what will be the best course to pursue with that particular tract, using any or all of the methods best calculated to bring about the desired result on that especial tract, or, if there have been none formulated that will serve the purpose, they should have a sufficient knowledge of the effect of treatment and consequent results to be able to decide with a certainty that the result will justify their decision, what course would be most advisable to pursue in the treatment of the tract in question.

There is to-day upon state land in the Adirondacks, a large amount of timber which should be removed and marketed, for the very apparent reason that the more mature trees are constantly dying and going to decay, and the state is unwisely losing money by allowing them to thus become unsalable. It would be a better policy to utilize such timber when it is possible to do so without serious injury to the forest. The moneys derived from the sale of timber could be placed in a separate fund and used only for the purpose of purchasing forest land to consolidate the park, for replanting waste or burned areas, or other desirable work for the improvement of the state forests. The sale of the timber when advisable and the use of the revenue derived from the sale to purchase forest boundary lines of the Adirondack Park, would be a long stride toward consolidating the state forest.

Any system of public forest management should have as its foundation

the perpetual maintenance of the forest to conserve and regulate the streamflow. The conservative removal of the mature timber should be considered as of secondary importance, and be done only in such manner that no serious damage be caused to the remaining forest, nor should the natural beauty of the forest be marred more than absolutely necessary, nor its capability of natural reproduction injured. In no place in the Adirondacks should so much timber of any species be cut as to make it necessary to replant, since this method will so open up the forest and break the sheltering foliage by removing the large-topped trees as to allow the unobstructed rays of the hot summer sun and the summer wind to dry up the moisture of the unprotected earth in a far greater degree than in those portions of the forest where but few trees are selected, and the protecting cover remains practically unbroken.

The marked difference in the earth's moisture between the too extensively thinned forest, and that portion from which but few trees per acre have been selected, is, in comparison, like the difference between a "fallow" cut for the purpose of clearing up the land, and the wise farmer's treatment of his maple sugar orchard, from which he removes only the old and defective trees for his fuel supply, or to make room for the growth of younger and thriftier trees in their stead. The general principles involved are the same, only in a lesser degree.

Forest fires are unquestionably the worst enemy of the forests throughout the United States, and they have done more to impair the beauty of the Adirondacks as a health and pleasure resort, and to lessen their efficiency as a regulator of the water flow, than all the other causes combined to which the destruction of the forests are usually attributed.

No system of forest management can ever bring them to the highest degree of usefulness and beauty com-

bined, which does not include therewith a thorough patrolling during the dry season by alert and energetic rangers, of all the main traveled trails, roads, railroads, and places where fires are most likely to be started. One forest fire, under certain conditions, would quickly and thoroughly destroy all the advantages gained by several seasons' hard work. In the matter of forest fires, the old adage might well be changed to read: "An ounce of prevention is worth many pounds of cure." Thorough patrolling and preventing the starting of forest fires in dry seasons is the best and the only sure way of fighting them.

I want to say right here that I am as bitterly opposed to allowing any of the old system of "cut and slash" lumbering to be put in operation in the public forests of the State of New York as anyone can possibly be. I am deeply interested in the welfare of the Adirondacks, where the greater part of my life has been spent in some capacity closely connected with the forests of this state, of which I am still a legal resident, and have an earnest desire to see the public forests of the Empire State administered on sound business principles, always carefully safeguarding the combined interests of the people.

## PRACTICAL RESULTS OF THE CUP AND GUTTER SYSTEM OF TURPENTINING

BY

CHARLES H. HERTY, Ph. D.

THE cup and gutter system of collecting crude turpentine, proposed as a substitute for the box system commonly in use, was described at length in Bulletin 40, Bureau of Forestry. The saving that it effected was also shown in the experimental tests, the results of which were given at the same time.

Since the publication of the bulletin, experimental and comparative tests have been carried on steadily, but only the results of a year's commercial test of the new system on the turpentine farm of Messrs. Powell, Bullard & Co., at Ocilla, Ga., have been published.

The matter contained in this article is issued to show the practical results of three years' working of the new system, to call attention to several improvements that have been made in equipment and methods, and to point out several faults that have

developed. All the comparative tests were made on similar half crops as described in Bulletin 40. Readers who are not familiar with turpentine are referred to that publication, but it may be said in general that in this system the resin is collected in a suitable vessel, preferably of hard burned clay, being caught and conducted to this vessel by inclined metal gutters inserted in shallow cuts in the tree.

The advantages claimed for the system were two: First, that it protects the tree against the destructive action of storms and fire; second, that it increases both the quality and the quantity of the product.

### RESULTS.

Since the publication of Bulletin 40 the plot of timber there described as a "first-year crop" has been worked two years more, as a "second-year crop" and as a "third-year crop," com-

plete records being kept of the yield from the "boxed" and "cupped" halves of the crop, together with careful studies of the condition of the trees in each.

Messrs. Powell, Bullard & Co. have courteously furnished the results of

the second and third years of operation. Summaries of these figures are given in Tables I, II, and III. They show that the cupped trees yielded \$1,284.04 per crop, or over 30 per cent, more than the boxed trees.

TABLE I.—*Spirits of turpentine from half crops.*

Year	Cups			Boxes			Excess from cupped half crop	Net price per gallon at time of operation	Value of cup excess
	From dip	From scrape	Total	From dip	From scrape	Total			
	<i>Gallons.</i>	<i>Gallons.</i>	<i>Gallons.</i>	<i>Gallons.</i>	<i>Gallons.</i>	<i>Gallons.</i>	<i>Gallons.</i>	<i>Cents.</i>	
First.....	1,385.3	205.0	1,590.3	1,134.7	153.7	1,288.4	301.9	40	\$120.76
Second.....	1,103.5	165.0	1,268.5	703.2	226.6	931.8	336.7	45	151.32
Third.....	781.3	134.0	917.3	536.1	190.5	726.6	190.7	45	85.82
Total.....	3,270.1	506.0	3,776.1	2,376.0	570.8	2,946.8	829.3		\$358.10

TABLE II.—*Net sales of rosin from half crops.*

Year	Cups			Boxes			Excess from cupped half crop
	From dip	From scrape	Total	From dip	From scrape	Total	
First.....	\$401.72	\$47.72	\$449.44	\$323.40	\$35.53	\$363.93	\$85.51
Second.....	286.88	58.24	345.12	132.42	84.08	216.50	128.62
Third.....	212.60	61.65	274.25	124.76	79.70	204.46	69.79
Total.....	901.20	167.61	1,068.81	585.58	199.31	784.89	283.92

TABLE III.—*Summary of gain from cupped half crops.*

Year	Spirits of turpentine	Rosin	Total
First.....	\$120.76	\$85.51	\$206.27
Second.....	151.32	128.62	280.14
Third.....	85.82	69.79	155.61
Total.....	358.10	283.92	642.02

*Total value of products from three years of operation.*

Cupped half crop.....	\$2,688.55
Boxed half crop.....	2,046.53

Gain from cupped half crop..... 642.02=\$1,284.04 per crop,

## CONDITION OF TREES.

At regular intervals during the three years of operation, careful study was made of the condition of the trees in each half of the crop. The results of these studies by years follow:

TABLE IV.—*Record of down and of dead trees.*

	Number of trees blown down		Number of trees dead.	
	Boxed	Cupped	Boxed	Cupped
In 1 year .....	8	3	35	16
In 2 years .....	60	34	139	83
In 3 years .....	78	44	217	150

Of the 44 trees blown down in the cupped half of the crop during the three years of operation, only 8 fell because they were being turpentine. These 8 were small trees on which too deep incisions had been cut by the broadax. Of the 78 trees blown down in the boxed half of the crop, the fall of 59 was due to the cutting of the boxes. The larger number of cupped trees blown down from causes other than the method of collecting the resin is due to the fact that many had doty hearts and were unfit for boxing, but just as well suited to cupping as sound trees. Many of these were snapped off above the turpentine face by a storm in the spring of 1903.

TABLE V.—*Productive surface lost from all causes.*

	Boxed trees	Cupped trees
	Per cent.	Per cent.
In 1 year .....	21.02	10.60
In 2 years .....	30.78	21.20
In 3 years .....	34.20	27.12

By far the greater part of this loss in both half crops was due to constantly increasing "dry face." It is evident that in the first year the box cutting was largely responsible for the wide disparity in the amount of dry

face in the two half crops, but after the first year the chipping was the determining factor. In fact, the rate of increase of dry face after the first year is greater in the cupped than in the boxed trees, and is due, no doubt, to the higher average number of faces per tree in the cupped half. (See Bulletin 40, page 27.)

## IMPROVEMENTS.

Since the cup and gutter system has been in use, a number of improvements in the equipment and in methods have been made.

*Cups.*—The quality of the cups has been materially improved. Many of those first used allowed the resin to seep through. This was due to the fact that the cups were made in molds, a method of manufacture requiring a soft, wet clay. This objection has been entirely overcome by the use of machinery and a stiff and much drier clay. The new cups allow no seepage and are just as desirable for collecting the resin as if they had been glazed at considerable cost.

*Shipping the cups.*—The complete success attained in shipping the cups in bulk has effected a saving to the operator, both in decreased breakage in transit and in the cost of the wooden crates formerly used.

*Dipping.*—At the time cups were introduced it was hoped that with experience the dippers would be able to collect as much gum per day from cups as is usual from boxes. This hope has been more than realized, for in practically all cases it has been found that the dippers are able to collect more gum per day from cups than from boxes. Difficulty was frequently experienced in getting good box dippers to undertake the dipping of cups, but after the change was once made a preference for cup dipping was uniformly noticed.

*Use of the broadax for facing.*—The most important advance made in the application of the cup and gutter system has been the substitution of the broadax for the club ax in making

the flat faces on the trees. The difficulty in using the cornering ax recommended in Bulletin 40, on the hard timber near the Gulf coast in south Florida, led to the suggestion by Mr. R. M. Radford, of Braidentown, Fla., that the broadax be used for making the faces. The experiment was tried, and the result was faster and better work and a good surface for beginning chipping. Later, Mr. H. H. Ellarbee, of Ellarbee, Fla., suggested that the usual setting of the broadax on the handle be reversed, so that in hewing the beveled side would be next

possible to double the speed of a squad, and many laborers have become very skillful in this use of the broadax. One laborer during the past winter prepared in one day 1,700 faces. Inspection of the work shows that it was well done in every respect.

*Directions for using the broadax.*—

The ax should weigh from 8 to 9 pounds and have a perfectly straight edge. The handle should be straight and not longer than 30 inches. Each laborer sets his ax on the handle so that its edge is parallel to the handle and the beveled side lies next to the tree in hewing.

By almost vertical strokes of the ax a flat surface is hewn one-half the width of the "face" which is to be chipped later (fig. 1). When the ax first catches the wood the chip is prized outward slightly, thus facilitating the easy entrance of the ax in the same cut on the second stroke and also keeping the surface smooth. On the third stroke it usually is possible to partly cut and partly break off the chip, thus avoiding useless mutilation of the tree. This is done by a twist of the ax, given just as it falls into the previous cut, the eye of the ax being thrown against the tree and the edge outward. The laborer then steps either forward or backward and hews the second side of the angular face (fig. 2), taking care to leave no rounded surface in the center where the two sides join.

On these flat surfaces the incisions for the gutters are then made, one a right-handed and the other a left-handed cut (fig. 3). In making these cuts the ax is held so that the outer point of the edge is lower than the inner point, while the eye of the ax is lower than the edge. By a single blow a cut is made the full width of one side of the face, this cut being about one-quarter of an inch deep at the outer edge of the face and a little deeper at the center. The cuts should be at least one inch apart at the center of the face, to prevent choking between the two gutters by chips and "scrape," and for convenience in clean-

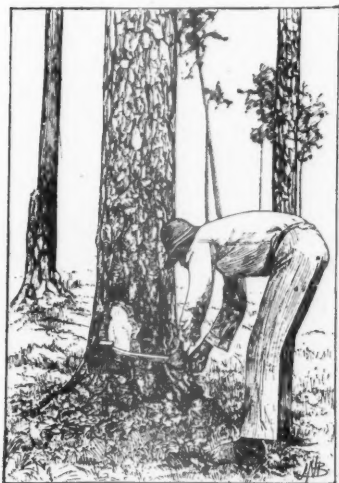


Fig. 1.—Making the first half of a face

to the tree. This change greatly increased the speed of the work, as the chip could be promptly slit off after the full width of the face had been obtained.

The next step was to have one man make both incisions for the gutters instead of employing a right-handed and a left-handed axman for making the two. At the outset the laborers usually insist that one man cannot make both cuts, but a little practice gives perfect facility in cutting each with equal ease.

These changes have made it easily

ing the gutters when the cups are dipped.

*Zinc nails.*—The cup and gutter system has been most favorable received by the owners of mills where the timber is sawed after it has been turpen-



Fig. 2. Making the second half of a face

tined. The only objection they make is to the use of iron nails for hanging the cups. To meet this objection zinc nails are now manufactured for use with the cups. Experiments have shown that if such a nail is left in the tree no damage whatever is done to a saw that strikes it, because the metal is so soft.

#### ERRORS MADE IN USING THE CUP AND GUTTER SYSTEM.

*Gutters.*—In making the incisions for the gutters the eye of the broadax is frequently turned down too much. The outer half of a gutter inserted in angle to the trunk of the tree, and hence forms a shelf rather than a trough (fig. 5, B). From such a gutter the resin frequently runs off along the outer edge. Furthermore, such a gutter is easily forced out when the dipper is removing the "scrape" from such an incision lies almost at a right it, the pressure of the dip knife being

almost in line with the direction of the cut. A gutter inserted carefully into a properly made incision will never fall out (fig. 5, A.)

*Nails.*—Two mistakes are frequently made in driving the nail on which the cup hangs. First, the nail is driven horizontally. In the latter part of the season, when hardened resin collects under the head of the nails, a cup hung on it will easily drop off. The head of the nail should have a steep slant upward. A cup hung on a nail so driven fits snugly between the nail and the tree, is secure, and cannot swing away from the spout of the lower gutter, though it may be easily removed by the dipper. Second, the nail is often driven into the tree above the lower end of the lower gutter. A cup hung on such a nail is never vertical, and its capacity is therefore diminished. Further, when a cup so hung fills with water or resin the increased weight tends to bring it to a vertical position, thereby pressing on the lower gutter and causing the latter to be prized out of the incision. The nail should always be driven into the tree at a point slightly lower than



Fig. 3.—Making incisions for the gutters

the lower end of the lower gutter (fig. 4.)

*Cups.*—Experience has demonstrated that the cups will be broken if wa-



ter is frozen in them. During the winter, therefore, when the cups are not in use, they should be removed from the nails and inverted at the base of the trees, so that water can not collect in them.

#### FIXING LOOSE GUTTERS.

In case a gutter is displaced during the chipping season, the accident can be easily repaired by reinserting it in

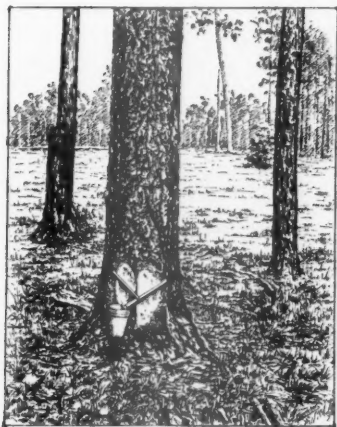


Fig. 4.—Cup and gutters properly placed

the old incision and driving two nails into the tree flush with the bottom of the gutter—one nail near the center of the face and the other near the upper end of the gutter. Supported by these two nails a gutter will stand the scraping of the dip knife without slipping. The gutter and both nails can readily be drawn from the tree at the end of the season.

The rapid introduction of the cup and gutter system by turpentine operators proves beyond a doubt that the experimental stage has been passed. No stronger confirmation of the value of the results obtained at Ocilla, Ga., could be given than the fact that by far the greater portion of the cups placed during the past winter were on farms where the cup had been tested on a small scale during the preceding season. Not all operators are yet con-

vinced; there are still doubters and scoffers, but their number is rapidly diminishing.

In the hands of a few the system has been abused. The fact that under it the trees are not weakened and made subject to overthrow by windstorms, as boxed trees are, has induced some operators to largely increase the number of cups per tree as compared with the average of boxes. The returns from such trees prove that there is a distinct limit to the sap surface which can be removed without weakening the vitality of the tree and lessening the flow of resin. The practice of overcupping results, therefore, in a financial loss.

In addition to the increased returns from the use of cups, the naval stores industry has been benefited in two other lines by the development of the cup system. In many cases timber owners have made decided concessions in their leases to operators, on condition that the cups be used and no boxes cut. In other instances large tracts of timber have been brought under turpentine operation by the cup system, though their owners have persistently refused to lease them for box cutting.

The rapid rise in the value of turpentine timber within the past few

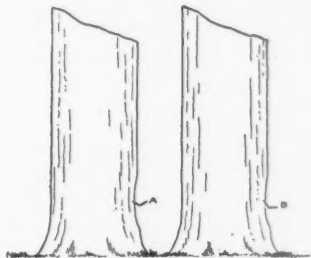


Fig. 5.—Position of gutters on the face  
A, correct; B, incorrect

years has contributed largely to its more conservative treatment. A thing of little value in the past, it has received only a small amount of care. Its rapid enhancement in value, and the strong probability of a still further

increase, gives the turpentine operator every reason to treat his timber carefully. Formerly it was an easy matter for an operator to work hastily through a place, then move a short distance and develop a new place on timber just as inexpensive as that on which he had been working. But now the operator knows that when his present location is exhausted he is certain

to experience difficulty in finding a new location, and equally certain that a largely increased price must be paid for it. This natural operation of the law of supply and demand is rapidly bringing serious and earnest thought to the question of how best to preserve the present holdings. The cup and gutter system with its great economies is doing much to solve the problem.

## RECENT PUBLICATIONS

### **Manual of the Trees of North America.**

By Charles Sprague Sargent, Pp. 826. Illustrated with plates by Charles Edward Faxon. Price, \$6.00 net. Houghton, Mifflin & Co., Boston.

Professor Charles Sprague Sargent has done a valuable service not alone for scientists, but for all those who are interested in outdoor life, by the publication of his "Manual of Trees." Up to the present time the author has appealed only to those who have made a special study of trees and shrubs; his monumental work, "The Silva of North America," being the greatest work on the subject ever published. But in this manual, he has set forth the general facts pertaining to the study of trees, their descriptions and uses, in a way which will appeal to the general public.

Persons traveling in Florida, California, or Canada will find it an interesting book to take along with them as a guide to the trees. Persons having country estates will find a genuine need for the volume, which will immediately be given a place similar to that held by Gray's Botany.

The Manual contains brief descriptions in plain and simple language of about 630 trees, accompanied by a figure of the leaves, fruits and flowers of each tree, with keys leading to a ready determination of the genera and species. It makes available in convenient form the most essential points of the information to be found in the "Silva of North America," and will be indispensable to every one interested in nature, to all teachers, to the owners of country places, landscape-gardeners, park superintendents, foresters, and lumbermen.

### **Type Studies from U. S. Geography.**

By Charles A. McMurray, Ph. D. Pp. 288. Illustrated. Price, 50 cents. Macmillan & Co., New York.

This volume contains twenty-five type studies in United States geography arranged in an interesting and instructive manner. Among the subjects treated are chapters on forests, lumbering and irriga-

tion. It is a volume that should help many to a better understanding of this country's resources.

### **The Tree Doctor.**

By John Davy. Pp. 87. Illustrated with half-tones from photos. Saalfeld Publishing Co., Akron, Ohio. Price, \$1.00.

This book is what the title indicates, a treatise on tree surgery, which gives many points worth knowing on the care of trees. It is handsomely and appropriately illustrated with nearly two hundred half-tones. There is also a fatherly lot of moralizing in different parts of the volume, and altogether it is a useful, though peculiar, book. Such a well printed volume deserves a better binding.

### **Official Proceedings of the Twelfth National Irrigation Congress, El Paso, Texas, November 16-18, 1904.**

Pp. 442. Illustrated. Published by Guy E. Mitchell. Galveston, Texas: Clarke & Courts, 1905.

This is the complete official proceedings of the Twelfth National Irrigation Congress—the most successful and widely attended convention in its existence. There is a vast amount of matter contained in the volume of practical value to all, but it should especially appeal to the westerner, the forester, the irrigator, the farmer, the stockman, and citizen of the arid and semi-arid half of our country.

### **Third Annual Report of the Reclamation Service, 1903-1904.**

F. H. Newell, Chief Engineer. House Document No. 28. Pp. 644. Washington, D. C., Government Printing Office, 1905.

In the first annual report of the Reclamation Service, issued November 29, 1902, a brief description of the location of the arid lands of this country and a summary of the history of the national irrigation movement, irrigation laws, and conditions in the various states were given. The second report included a general discussion of the reclamation law, decisions relating to the

same made by the Secretary of the Interior, and gave particular details of the work accomplished in each state. In this, the Third Annual Report, is given a continuation of the description of the work begun; in particular an exhibit is made of the operations carried on during the greater part of the calendar year 1904. This matter is preceded by a general discussion of the reclamation law and of the general questions of policy or practice which have arisen. It should prove an exceedingly helpful volume to the homeseeker, irrigator, farmer, or general student of the West. Each particular section of the country in which work has been begun, or is under consideration is described and the experts of the service write of its feasibility, methods of utilization of the water realized, etc.

**The Nile in 1904.** By Sir William Willcocks, K. C. M. G., F. R. G. S. Pp. 225. Illustrated with maps and diagrams. E. & F. N. Spon, Limited, London. American agents, Spon and Chamberlain, 123 Liberty street, New York. National Printing Department, Cairo, Egypt, 1904. Price, 9 shillings.

There has probably never been so gigantic an engineering enterprise so successfully accomplished as the harnessing of the Nile by the Public Works Department of Egypt. Sir William Willcocks has played no small part in the subjugation of this majestic river, his twenty years of experience in irrigation gained through work in India and Egypt have equipped him, as well as any of those concerned in the stupendous works along the Nile, to write of what has been accomplished. Sir William modestly acknowledges in a preface his indebtedness to several previous reports by such of his co-workers as Sir William Garston, and others. The volume itself is an authoritative description of the Nile and the Nile country, with descriptions, diagrams, statistical matter, and maps innumerable, and the semi-narrative style, with history of the operations make it very interesting. The statistical matter, minute descriptions of localities (supplemented by maps) and discussions of irrigation in all its phases in Egypt make it an exceedingly valuable volume.

**Proceedings of the Third Irrigation Congress, held at Bismarck, N. D., January 25, 26, 1905.** Published by authority of the State, Bismarck, N. D., 1905.

This report is replete with valuable addresses and information, and it should be in the hands of every one interested in the material welfare of the state, and especially of those interested in the reclamation of land either by irrigation or drainage. It contains papers upon "General Farming in North Dakota," "Pumping Water for Irrigation," "The Development of Irrigated Agriculture in North Dakota," "Intensive

Farming by Aid of Irrigation," "Fruit Growing," "Coöperative Canal Construction," "Irrigation and Drainage Investigations," "Alfalfa and Its Possibilities," "The Artesian Basin in North Dakota," and a number of others, all by the highest and most competent authorities. It contains also the North Dakota Irrigation Code, the United States Reclamation Act, a proposed form for Articles of Incorporation for Water Users' Associations and other important information. It is seldom that so much of value concerning the subjects treated has been brought into such practicable form and so small compass. Copies may be obtained by application to the State Engineer, A. L. Fellows, at Bismarck.

**The A, B, C of Bee Culture.** By A. I. Root, revised by E. R. Root. Pp. 490. Copiously illustrated. The A. I. Root Company, Medina, Ohio, 1905.

Here is an immense lot of practical information about bees and bee culture arranged in the form of a cyclopedia for bee-keepers generally. The publishers are one of the largest manufacturing plants solely concerned with honey in the country, and the matter contained in this book has been gathered by them from bee-keepers all over the country, and verified by practical work in their own factory. The book was originally written in 1878; this is the fourth edition issued since that time, and has been brought up to date and re-edited by Mr. Ernest R. Root. The matter contained is extremely diversified and eminently practical in its nature, and so presented as to be easily accessible for reference. There is a lack of entire continuity through the book through numerous changes ranging from the editorial "we," the personal "I" to the impersonal "one," which are slightly confusing.

**Yearbook of U. S. Department of Agriculture for 1904.** Pp. 776, illustrated. Washington, Government Printing Office, 1905.

The 1904 Yearbook of the Department of Agriculture contains many articles which should prove of particular interest to the forester and irrigator, as well as the farmer, for whom it is especially designed. Besides the formal report of the Secretary for the fiscal year of 1904, the volume is given over to articles dealing with special phases of the Department's work in all its varied fields of activity. "The Attitude of Lumbermen Toward Forest Fires," by E. A. Sterling; "Forest Planting and Farm Management," by Geo. L. Clothier; "Potato Culture Near Greeley, Colorado," by J. Max Clark; "Insect Injuries to Forest Products," by Dr. A. D. Hopkins, and "The Determination of Timber Values," by Edward A. Braniff, are all valuable additions to the existing literature on forestry and irrigation.

DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, Washington, D. C., June 9, 1905. Sealed proposals will be received at the office of the Supervising Engineer, United States Reclamation Service, 1108 Braly Building, Los Angeles, California, until 2 o'clock p. m., August 17, 1905, and thereafter opened, for the construction of about 12 miles of dike, involving excavation of about 445,000 cubic yards of earth, and clearing 125 acres, for the reclamation of Yuma Valley, Arizona. Specifications, forms of proposals and plans may be obtained from the Chief Engineer of the Reclamation Service, U. S. Geological Survey, Washington, D. C., from the Supervising Engineer, Los Angeles, California, and from the Engineer of the Reclamation Service, Yuma, Arizona. Each bid must be accompanied by a certified check for three (3) per cent. of the amount of the bid, payable to the order of the Secretary of the Interior, as a guaranty that the bidder will, if successful, promptly execute a satisfactory contract, and furnish bond in the sum of 20 per cent. of the contract price for the faithful performance of the work. It must also be accompanied by the guaranty of responsible sureties to furnish bond as required, if the bid be accepted. The right is reserved to reject any or all bids, to accept one part and reject the other, and to waive technical defects, as the interests of the Service may require. Bidders are invited to be present. Proposals must be marked: "Proposals for the construction of dikes, Yuma project." E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, Washington, D. C., July 3, 1905. Sealed proposals will be received at the office of the Engineer, U. S. Reclamation Service, Montrose, Colorado, until 10 o'clock a. m., August 28, 1905, for the construction of about 8 miles of main distributing canal, involving the excavation of 52,000 cubic yards of material and the placing of 20,000 cubic yards of concrete masonry for the conveyance and partial distribution of 1,300 cubic feet of water per second from the mouth of the Gunnison Tunnel, near Cedar Creek, to a point on the Uncompahgre River 9 miles south of Montrose, Colo. Full information may be obtained from the Chief Engineer of the Reclamation Service, United States Geological Survey, Washington, D. C., from the Supervising Engineer of the Reclamation Service, Chamber of Commerce Building, Denver, Colo., or from the Engineer of the Reclamation Service, Montrose, Colo. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, Washington, D. C., July 12, 1905. Sealed proposals will be received at the office of the Supervising Engineer, United States Reclamation Service, Chamber of Commerce Building, Denver, Colo., until 2 o'clock p. m., August 16, 1905, and thereafter opened, for the construction of the Pathfinder Dam and auxiliary works, at a point about 50 miles southwest of Casper, Wyo., to impound the flow of North Platte River. Plans, specifications, and forms of proposal may be obtained by application to the Chief Engineer of the Reclamation Service, U. S. Geological Survey, Washington, D. C., or to the Supervising Engineer of the Reclamation Service, at Casper, Wyoming. Each bid must be accompanied by a certified check for \$10,000, payable to the order of the Secretary of the Interior, as a guaranty that the bidder will, if successful, promptly execute a satisfactory contract and furnish bond in the sum of \$50,000 for the faithful performance of the work. Each bid must also be accompanied by the guaranty of responsible sureties to furnish bond as required, if bid be accepted. The right is reserved to reject any or all bids, to accept one part and reject the other, and to waive technical defects, as the interests of the Service may require. Bidders are invited to be present when bids are opened. Proposals must be marked: "Proposals for Pathfinder Dam, Wyoming." F. L. CAMPBELL, Acting Secretary.

DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, July 7, 1905. Sealed proposals will be received at the office of the United States Reclamation Service, Billings, Mont., until 2 o'clock p. m., September 5, 1905, for the construction of the Shoshone dam, spillway, outlet and road tunnels, requiring about 69,000 cubic yards of concrete masonry and about 75,000 cubic yards of excavation, located eight miles west of Cody, Wyoming. Plans, specifications and proposal blanks may be obtained from the Chief Engineer of the Reclamation Service, Washington, D. C., or from Jeremiah Ahern, Engineer, Cody, Wyoming. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, July 7, 1905. Sealed proposals will be received at the office of the United States Reclamation Service, Billings, Mont., until 2 o'clock p. m., September 6, 1905, for the construction of a tunnel approximately 18,000 feet long, and auxiliary works, including about 28,000 cubic yards of excavation in open cut, all located ten miles east of Cody, Wyoming. Plans, specifications and proposal blanks may be obtained from the Chief Engineer of the Reclamation Service, U. S. Geological Survey, Washington, D. C., or from Jeremiah Ahern, Engineer, Cody, Wyoming. E. A. HITCHCOCK, Secretary.

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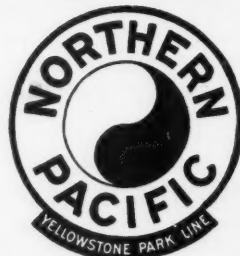
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